APPENDIX 5

FARM MANAGEMENT AND AGRICULTURAL EXTENSION

APPENDIX 5 FARM MANAGEMENT AND AGRICULTURAL EXTENSION

Contents

Table A5-1 Extension Offices Breakdown under MoAFS

ADD	No. of DAO	No. of EPA	No .of Section	No. of Farm Family	No. of Block	No. of AEDO
National Total	28	192	2,239	3,063,393	14,894	1,492
Karonga ADD	Karonga	Kapolo North	9	11,408	8	9
		Kapolo South	8	9,356	8	4
		Mpata	11	14,288	8	10
		Lupembe	8	6,779	8	8
		Vinthukutu	10	15,192	8	6
		Nyungwe	7	6,354	8	7
	Subtotal	6	53	63,377	48	42
	Chitipa	Kameme	7	4,904	8	5
		Mwamkumba	6	6,081	8	5
		Lifita	11	16,301	8	9
		Chisenga	7	4,556	8	4
		Kavukuku	11	6,573	8	6
		Misuku	9	7,096	8	7
	Subtotal	6	42	38,415	40	29
ADD Total	2	12	95	101,792	88	71
Mzuzu ADD	Rumphi	Bolero	13	14,442	8	10
		Chiweta	5	5,795	8	4
		Katowo	9	7,757	8	9
		Mhuju	**10**	**8,814**	**8**	**7**
		Mphompha	7	2,957	8	6
		Nchenachena	9	6,575	8	8
	Subtotal	6	53	46,340	48	44
	Mzimba	Bwengu	14	19,944	112	15
		Zombwe	10	17,577	80	11
		Emsizini	7	10,737	56	7
		Mpherembe	8	13,462	64	8
		Malidade	5	6,601	40	4
		Mbalachanda	5	4,968	40	3
		Euthini	11	13,258	88	6
		Bulala	12	15,278	96	8
		Eswazini	7	8,394	56	8
		Manyamula	9	13,100	72	5
		Mjinge	4	6,631	32	4
		Njuyu	5	6,648	40	4
		Kazomba	12	15,865	96	13
		Mbawa	13	12,215	104	7
		Vibangalala	9	11,058	72	6
		Champhira	13	13,450	104	10
		Emfeni	6	20,431	48	6
		Luwerezi	**7**	**7,121**	**56**	**3**
		Khosolo	8	7,380	64	9
	Subtotal	19	165	224,118	1,320	137
	Nkata-bay	Chiteka	4	3,901	32	1
		Mzenga	5	4,432	40	3
		Mpamba	8	5,476	48	6
		Nkhata-bay	8	10,784	64	5
		Cintheche	9	8,816	72	7
		Tukombo	6	5,602	48	3
		Chikwina	6	7,264	48	1
		Limphasa	5	3,752	40	5
		Kavuzi	4	4,862	32	4
	Subtotal	9	53	54,889	424	35
	Likoma	Likoma	1	1,382	8	0
		Chizumulu	1	719	8	0
	Subtotal	2	2	2,101	16	0
ADD Total	4	36	273	327,448	1,808	216
Kasungu ADD	Ntchisi	Chipuka	2,239	3,063,393	14,894	1,492
		Malomo	9	11,408	8	9

ADD	No. of DAO	No. of EPA	No .of Section	No. of Farm Family	No. of Block	No. of AEDO
		Chikwatula	8	9,356	8	4
		Kalira	11	14,288	8	10
	Subtotal	4	47	60,138	376	41
	Dowa	Bowe	12	17,022	96	10
		Madisi	11	17,633	88	10
		Chsepo	12	19,906	96	8
		Mponela	16	20,675	128	16
		Nachisaka	11	20,590	88	10
		Chibvala	7	11,138	56	6
		Mvera	14	23,941	112	14
		Naluna	7	7,781	56	3
	Subtotal	9	102	159,131	816	88
	Mchinji	Mkanda	11	27,679	88	6
		Mikundi	7	17,843	56	6
		Chioshya	10	24,011	80	7
		Mlonyeni	9	20,693	72	8
		Msitu	9	26,507	72	6
	Subtotal	6	56	141,347	448	41
	Kasungu	**Chulu**	**6**	**17,998**	**48**	**4**
		Kaluluma	13	31,078	104	11
		Chipala	10	41,143	80	13
		Chamama	10	40,327	80	8
		Lisasadzi	6	23,244	48	5
		Santhe	7	23,836	56	6
	Subtotal	6	52	177,626	416	47
ADD Total	4	25	108	318,973	864	88
Salima ADD	Salima	Chpoka	12	13,246	96	8
		Katelera	11	12,454	88	6
		Makande	9	6,156	72	6
		Tembwe	13	1,564	104	14
		Chinguluwe	13	9,049	104	11
		Matenje	11	11,902	88	7
		Chiluwa	11	11,971	88	6
	Subtotal	7	80	66,342	640	58
	Nkhota-kota	Mtosa	10	7,494	80	7
		Zidyana	9	12,403	72	8
		Mwansambo	13	6,662	104	7
		Linga	14	16,794	112	9
		Mphonde	11	6,794	88	7
		Nkhunga	13	15,730	104	7
		Kasitu	7	6,069	56	6
	Subtotal	7	77	71,946	616	51
ADD Total	2	14	157	138,288	1,256	109
Lilongwe ADD	Ntcheu	Njolomole	13	14,064	104	6
		Kandeu	20	23,147	160	7
		Bilira	11	23,147	88	4
		Nsipe	19	15,700	152	8
		Sharpevally	15	27,345	120	6
		Tsanano	13	15,405	104	2
		Manjawira	**16**	**20,279**	**128**	**10**
	Subtotal	7	107	139,087	856	43
	Dedza	Kabwazi	17	15,299	136	7
		Golomoti	13	10,913	104	5
		Lobi	19	26,264	152	8
		Kaphuka	17	16,264	152	8
		Kanyama	19	23,145	152	10
		Chafumbwa	15	14,888	120	7
		Mtakataka	13	14,830	104	8
		Bembeke	13	14,868	104	9
		Mayani	13	18,637	104	10
		Linthipe	26	18,497	208	9
	Subtotal	10	165	174,264	1,320	79

ADD	No. of DAO	No. of EPA	No .of Section	No. of Farm Family	No. of Block	No. of AEDO
	Lilongwe	Ukwe	20	18,791	160	9
		Mkwinda	18	18,909	144	10
		Chwamba	20	15,933	160	6
		Chilaza	13	11,488	104	4
		Mngwangwa	24	24,997	192	17
		Demera	15	16,908	120	5
		Mlomba	**13**	**15,856**	**104**	**8**
		Chitekwere	19	24,270	152	9
		Malingunde	16	17,684	128	4
		Chingonthi	13	20,207	104	15
		Chileka	15	15,938	120	10
		Nthongo	14	17,793	112	6
		Chitsime	20	22,919	160	22
		Ming'ongo	20	23,035	160	9
		Mpenu	21	20,656	168	12
		Mpingu	15	19,872	120	17
		Thawale	12	11,197	96	4
		Nyanja	15	14,933	120	8
		Mitundu	14	12,595	112	7
	Subtotal	19	320	347,717	2,560	186
ADD Total	3	36	592	661,068	4,736	308
Machinga ADD	Blaka	Bazale	16	27,887	128	15
		Mpilisi	12	15,826	96	9
		Phalula	7	7,300	66	9
		Rivirizi	7	7,294	56	7
		Ulongwe	11	27,272	88	13
		Utale	7	10,319	56	6
	Subtotal	6	60	95,898	490	59
	Machinga	Chikweo	11	21,531	88	6
		Mbonechera	9	24,920	80	6
		Nampeya	9	14,633	72	4
		Nsanama	7	14,633	72	4
		Ntumbi	10	16,274	72	10
		Domasi	5	15,453	0	4
		Nanyumbu	12	22,394	96	11
	Subtotal	8	71	153,207	518	58
	Mangochi	Nasenga	11	25,329	88	10
		Chilipa	7	14,111	56	7
		Katuli	16	13,687	128	11
		Lugwena	10	20,924	80	9
		Maiwa	12	17,662	96	14
		Masuku	16	25,387	128	13
		Mbwadzulu	10	20,581	80	6
		Mpilisi	10	18,427	80	7
		Mthiramanga	10	16,762	80	5
		Nankumba	8	16,827	64	5
		Ntiya	16	30,323	128	12
	Subtotal	11	126	220,020	1,008	99
	Zomba	Chingale	18	28,853	136	16
		Dzaone	14	29,608	122	12
		Malosa	8	20,018	64	14
		Mpokwa	22	27,010	136	13
		Ngwereilo	9	19,341	72	11
		Nsodole	10	19,757	64	13
		Thawale	18	35,571	144	15
		Likangala	4	14,631	88	10
	Subtotal	8	103	194,789	816	104
ADD Total	4	33	360	663,914	2,832	320
Blantyre ADD	Mwanza	Mwanza	16	20,222	128	13
		Thambani	6	3,826	48	4
	Subtotal	2	22	24,048	176	17
	Neno	Neno	12	14,060	26	9
		Lisugwi	17	140,667	34	13
	Subtotal	2	29	154,727	60	22
	Blantyre	Lirangwe	16	23,600	128	17

ADD	No. of DAO	No. of EPA	No .of Section	No. of Farm Family	No. of Block	No. of AEDO
		Kunthembwe	22	31,440	176	18
		Ntonda	19	39,271	152	18
		Chipande	26	46,422	208	18
	Subtotal	4	83	140,733	664	71
	Chiradzulu	Mombezi	23	38,289	116	15
		Thumbwe	26	33,518	118	16
		Mbulumbuzi	13	18,202	118	15
	Subtotal	3	62	90,009	352	46
	Thyolo	Matapwata	26	29,971	52	6
		Thyolo Boma	22	29,302	46	8
		Masambanjati	27	29,960	50	14
		Dwale	27	20,641	54	17
	Subtotal	4	102	109,874	202	45
	Mulanje	Kamwendo	20	24,432	72	15
		Msikawanjala	20	27,361	80	10
		Mulanje Boma	30	27,392	80	10
		Thuchila	31	34,807	112	10
	Subtotal	4	101	113,992	344	45
	Phalombe	Naminjiwa	13	16,769	8	6
		Waruma	13	1,610	8	3
		Kasonga	12	13,917	8	7
		Tamani	10	12,434	8	7
		Mpinda	9	8,703	8	7
		Nkhulambe	15	17,985	8	8
	Subtotal	6	72	71,418	48	38
ADD Total	7	25	471	704,801	1,848	284
Shire Valley ADD	Chikwawa	Kalambo	21	1,668	168	9
		Mitole	19	18,203	152	11
		Livunzu	18	20,603	144	11
		Mikalango	29	23,021	232	14
		Dalo	15	14,268	120	10
		Mbewe	22	11,918	176	11
	Subtotal	6	124	89,681	992	66
	Nsanje	Makhanga	13	14,544	112	5
		Magoti	13	11,985	104	6
		Mpatsa	10	7,623	80	8
		Zunde	11	11,761	88	7
		Nyachilemda	12	11,515	88	4
	Subtotal	5	59	57,428	472	30
ADD Total	2	11	183	147,109	1,464	96

Note:Bold figures show Verification Study EPA
Source:2007/08 Annual Agricultural Statistical Bulletin, MoAFS

A5-2 Annual Rainfall by Meteorological Station

District	Station	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/6/1	2006/07	Average
Northern Region																						
Chitipa	Chitipa	946.5	919.3	1,252.2	870.3	1,027.6	764.2	640.8	944.8	1,002.6	948.2	1,369.6	838.3	624.6	933.9	792.0	943.8	883.0	1,079.0	944.6	1,066.0	939.6
Karonga	Karona Aerod.	771.7	908.5	736.5	824.8	897.1	882.2	467.4	721.5	1,051.1	441.9	1,329.1	893.8	756.4	1,190.2	1,312.4	916.5	1,217.0	1,081.0	1,096.0	796.7	914.6
Nkata Bay	Nkata Bay Met.	1,428.5	1,843.3	2,028.9	1,657.9	1,134.2	1,537.9	1,194.4	1,739.7	1,979.9	1,375.3	1,865.1	2,396.3	1,199.9	1,758.2	1,927.7	1,743.8	1,771.8	1,105.0	1,630.0	1,465.0	1,639.1
Rumphi	Bolro Met.	487.5	560.8	690.7	531.0	297.7	667.1	446.8	589.2	686.1	655.8	539.4	494.2	409.7	618.9	752.5	672.0	695.4	660.7	476.7	745.4	583.9
Mzimba	Mzuzu	1,185.9	1,654.7	1,048.6	1,505.6	740.3	784.5	932.9	834.9	1,380.4	913.9	1,207.7	1,633.8	1,153.5	1,115.8	1,244.9	1,359.2	1,410.9	1,004.0	1,048.0	1,173.0	1,166.6
Mzimba	Mzimba Aerod.	801.9	963.9	1,126.7	730.4	813.9	760.0	731.6	906.2	883.5	587.6	765.3	928.9	697.0	1,171.0	936.3	763.1	906.6	939.2	642.8	898.0	847.7
Central Region																						
Kasungu	Kasungu Met.	830.7	916.6	887.5	771.1	516.4	795.3	837.0	499.2	910.9	856.4	468.8	837.9	546.3	897.1	596.8	1,048.1	815.8	897.3	553.1	1,150.0	781.6
Dowa	Dowa Agric	893.4	1,146.8	840.0	695.9	604.2	851.6	514.4	707.8	918.8	712.2	1,310.2	912.3	717.4	1,637.0	792.2	990.2	645.5	743.4	795.3	996.3	871.2
Nkhota Kota	Nkhota Kota Met.	1,251.1	1,692.9	1,284.3	1,352.3	1,022.6	2,145.2	1,039.1	1,068.6	1,219.8	1,347.1	1,685.5	1,271.8	1,623.4	1,702.5	1,433.2	1,205.4	1,326.0	1,302.0	1,374.0	1,310.0	1,382.8
Salima	Salima Airport	1,717.5	1,691.8	1,059.9	1,072.6	1,039.8	1,333.9	848.2	458.5	1,157.1	1,233.6	1,697.1	1,240.6	761.9	1,407.4	1,559.9	1,627.9	1,114.5	905.9	1,671.0	1,367.0	1,248.3
Lilongwe	Chitedze Met.	908.7	1,076.7	1,125.1	655.7	622.5	896.1	598.6	478.5	1,048.7	796.2	1,156.7	1,285.1	668.7	987.7	787.1	1,038.0	775.7	796.7	710.1	1,007.0	871.0
Lilongwe	KIA Met.	741.0	1,070.1	862.8	776.1	688.4	974.1	632.4	611.2	1,102.6	893.2	889.3	969.7	866.7	800.3	1,069.5	1,122.4	662.5	871.4	782.4	722.7	855.4
Mchinji	Mchinji Boma	1,127.6	1,306.2	1,051.0	765.7	673.0	3,115.0	806.1	539.0	862.6	851.7	1,338.6	1,433.2	825.4	1,705.4	869.5	1,173.3	840.3	691.1	1,355.0	1,220.0	1,127.5
Dedza	Dedza Met.	936.9	1,367.4	901.7	961.4	883.9	1,237.3	870.2	721.8	880.2	1,153.9	874.2	827.2	817.3	847.4	850.4	1,289.3	699.6	715.9	937.3	883.5	932.8
Ntcheu	Nkhande Agric.	2,933.4	3,443.5	3,481.1	2,009.4	2,121.1	2,454.4	1,642.8	1,960.4	1,035.3	1,331.3	1,140.5	888.3	910.9	919.4	1,050.7	1,622.1	661.5	1,070.0	1,112.0	1,155.0	1,647.2
Southern Region																						
Mangochi	Mangochi Aerod.	738.7	952.0	695.4	895.1	453.9	854.1	342.0	342.8	807.6	1,450.2	677.5	604.8	663.6	1,236.1	787.9	1,031.9	514.4	691.0	883.9	1,173.0	789.8
Mangochi	Monkey Bay	907.1	1,189.2	920.1	920.7	965.5	965.5	476.3	427.1	1,024.6	958.1	757.3	849.8	977.6	1,349.6	969.0	1,278.0	583.4	855.9	878.9	900.4	907.7
Balaka	Balaka Town	721.9	880.2	703.5	943.3	338.7	783.4	686.9	900.7	715.6	1,351.8	706.9	1,120.0	804.3	870.8	894.8	673.0	986.1	497.9	1,060.0	932.9	828.6
Zomba	Makoka	1,129.4	1,225.3	1,008.1	1,030.5	579.3	977.7	538.5	595.2	965.7	1,120.7	1,015.9	1,175.4	819.3	1,206.7	852.8	949.9	714.8	911.1	1,268.0	1,064.0	957.4
Zomba	Chancellor College	1,459.3	1,637.3	1,165.4	1,184.4	1,156.7	1,334.8	763.4	884.4	1,591.4	1,943.4	1,237.5	1,302.4	894.4	1,673.0	1,012.8	1,491.4	1,115.4	1,077.0	1,282.0	1,208.0	1,270.7
Zomba	Chingale Agric.	1,161.5	1,135.7	733.7	825.6	561.8	651.0	544.2	544.7	987.1	1,333.9	890.5	873.1	788.1	1,551.5	1,051.7	876.1	780.5	378.0	918.4	1,038.0	881.3
Chiradzulu	Mombezi Agric.	1,172.4	1,115.7	748.3	826.8	387.2	836.1	762.0	794.1	968.6	1,296.4	1,073.1	1,219.6	862.3	1,379.2	859.9	837.8	643.4	529.8	1,179.0	821.2	915.6
Blantyre	Chileka Airport	1,130.1	1,143.4	778.1	833.5	652.5	743.5	695.5	546.0	969.2	1,431.2	986.3	954.8	766.1	1,106.7	856.9	794.5	606.4	521.3	1,082.0	973.7	878.6
Blantyre	Chichiri Met.	1,133.8	1,203.2	933.4	873.8	787.9	1,604.0	1,040.8	695.5	1,262.3	1,501.9	1,034.2	1,415.8	1,107.3	1,256.9	1,130.1	1,181.7	851.9	871.0	1,316.0	1,261.0	1,123.1
Mwanza	Mwanza Boma	1,122.6	1,288.6	973.5	802.3	469.8	878.9	1,204.5	1,315.7	675.2	1,478.9	1,316.0	1,114.1	829.9	1,241.3	1,062.1	988.5	632.8	792.4	1,064.0	805.8	1,002.8
Thylo	Thylo Met.	1,394.1	1,637.6	1,080.2	897.4	736.9	1,285.0	766.8	969.2	1,516.7	1,669.6	1,399.6	1,849.7	1,167.0	1,473.0	1,825.2	1,191.4	866.6	1,106.0	1,407.0	1,314.0	1,277.7
Thylo	Bvumbwe Met.	1,239.2	1,288.5	1,078.6	959.7	780.4	1,212.7	795.6	786.6	1,039.2	1,652.6	1,405.4	1,639.5	908.4	1,512.4	1,216.8	910.4	821.5	836.9	1,359.0	1,201.0	1,132.2
Mulanje	Mimosa	1,547.6	2,356.5	1,727.8	1,494.3	811.2	1,635.5	1,344.4	1,512.5	1,578.9	1,514.9	1,871.3	2,165.9	1,420.7	2,111.3	1,804.5	1,598.1	981.6	1,069.0	1,708.0	1,527.0	1,589.1
Chikwawa	Chikwawa Boma	772.5	1,123.5	638.5	591.2	430.4	905.5	506.4	419.0	1,205.5	1,440.1	678.1	1,044.8	791.1	1,034.9	736.2	856.2	660.0	477.2	819.4	1,390.0	826.0
Chikwawa	Ngabu	992.4	1,062.7	663.5	800.1	363.2	772.9	5,899.7	792.2	1,009.5	994.0	1,335.8	1,013.2	963.3	1,116.8	715.1	765.0	411.2	521.1	822.2	983.1	1,099.9
Nsanje	Nsanje Boma	1,255.6	1,645.6	1,095.0	665.7	359.5	1,024.7	784.7	723.9	1,285.7	1,184.7	1,157.6	1,791.1	992.5	2,179.5	774.7	690.5		519.8	1,430.0	1,014.0	1,082.9
National Average		1,123.6	1,337.0	1,081.3	981.4	736.1	1,150.5	775.6	807.4	1,087.8	1,174.9	1,138.1	1,193.1	875.0	1,290.1	1,049.2	1,084.5	859.9	823.1	1,087.0	1,083.0	1,036.9

Source:2007/08 Annual Aricultural Statistical Bulletin (Diretorate of Meteoroloy)

A5-3 (1/3) National Smallholder Crop Estimate (Hectarage)

CROP	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	Average
	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha
MAIZE	**1,369,153**	**1,435,223**	**1,446,264**	**1,513,945**	**1,617,917**	**1,478,750**	**1,513,929**	**1,762,839**	**1,615,356**	**1,596,955**	**1,535,033**
Local	767,056	798,636	906,405	831,988	767,012	720,890	768,605	654,176	564,731	559,912	733,941
Composite	45,441	107,903	207,333	232,626	277,823	334,184	372,703	545,553	585,486	587,041	329,609
Hybrid	509,613	528,684	332,526	372,445	457,056	423,676	372,621	424,301	465,139	450,002	433,606
Winter Crop	47,043	0	0	76,886	116,026	0	0	138,809	0	0	37,876
RICE	**44,576**	**45,983**	**50,139**	**56,463**	**54,393**	**42,554**	**48,993**	**52,031**	**58,091**	**63,124**	**51,635**
Local	11,707	16,145	33,080	35,568	34,422	27,478	33,578	31,507	34,342	36,171	29,400
Faya	27,519	22,852	11,801	16,418	13,839	10,332	10,167	9,179	10,199	9,836	14,214
B. bonnet	52		0	0	0						5
IET'4094	1,510	2,619	573	373	734	558	322		647	461	780
IR'1561	69										7
Mutupatupa			89			19	57	171	460	323	112
TCG 10	0	532	764	1,122	1,652	1,159	457	1,252	1,153	1,482	957
Pusa	1,510	2,824	2,847	1,826	2,715	1,678	1,182	2,932	3,373	4,149	2,504
Kilombero	0	16	23	212	1,031	911	3,230	6,990	7,917	10,702	3,103
Cert. Seed		13									13
Winter Crop	2,209	982	962	944		419					552
GROUNDNUTS	**170,004**	**169,073**	**181,337**	**198,306**	**216,760**	**207,786**	**248,276**	**244,567**	**258,111**	**266,115**	**216,034**
TOBACCO	**116,331**	**118,752**	**114,097**	**122,033**	**127,521**	**136,012**	**141,527**	**136,527**	**118,551**	**1,441,626**	**257,298**
NDDF	21,792	19,111	10,724	12,286	16,190	14,978	5,266	5,388	5,967	5,696	11,740
SDDF	1,938	1,055	877	1,080	2,460	2,221	706	472	294	264	1,137
Flue cured		73	42	72	74	976	3,643	4,435	5,254	5,998	2,057
Low nitro somina	69										
Sun-air	1,317	976	0	0	0	0	0	0	101	84	248
Oriental	1,079	1,831	3,327	1,911	1,713	1,161	812	1,016			1,285
Burley	90,205	95,706	99,127	106,684	107,084	116,676	131,100	125,216	106,935	1,429,584	240,832
COTTON	**53,191**	**40,372**	**47,327**	**45,867**	**43,296**	**63,447**	**88,535**	**62,233**	**60,673**	**69,826**	**57,477**
WHEAT	**2,101**	**2,278**	**2,493**	**2,720**	**2,701**	**2,113**	**1,987**	**1,656**	**2,005**	**1,479**	**2,153**
SORGHUM	**59,310**	**55,030**	**54,098**	**54,404**	**59,627**	**63,459**	**68,419**	**70,644**	**74,131**	**74,569**	**63,369**
MILLET	**33,672**	**34,257**	**34,169**	**34,234**	**38,758**	**37,368**	**41,192**	**41,491**	**44,878**	**43,988**	**38,401**
PULSES	**404,572**	**462,116**	**456,762**	**510,687**	**572,427**	**421,980**	**481,840**	**490,471**	**524,412**	**525,251**	**485,052**
Beans	135,489	167,522	214,643	227,993	232,762	204,514	233,845	242,568	260,306	260,287	217,993
Pigeon peas	126,240	137,057	135,608	139,652	147,659	138,585	155,990	150,173	161,508	167,787	146,026
Grams	66,994	61,082	3,912	3,988	4,345	3,703	2,395	1,709	1,956	1,731	15,182
Soya beans	64,284	2,083	52,635	45,428	50,981	47,128	68,524	71,652	75,475	70,070	54,826
Vevet beans		3,439	10,068	11,080	11,559	11,782	9,621	8,789	8,962	9,020	8,432
Ground beans	11,565	73,662	13,280	13,018	13,773	13,064	9,280	13,766	14,593	14,700	19,070
Pure stand		4,319	14,327	16,557	53,579						8,878
Interplanted			9,401	50,014	54,188						11,360
Chick peas		12,952	2,888	2,957	3,581	3,204	2,185	1,814	1,612	1,656	3,285
GUAR BEANS	**3,104**	**9,741**	**4,473**		**10**						**1,733**
CASHEW	**21,411**	**36,149**	**252,943**	**76,550**	**74,650**			**24,895**	**62,334**	**94,971**	**64,390**
MACADAMIA	**19,069**	**2,933**	**21,166**	**21,466**	**4,186**	**878**	**72,426**		**16,356**	**38,080**	**19,656**
SESAME	**836**	**866**	**849**	**927**	**886**	**714**	**546**	**719**	**1,128**	**2,159**	**963**
SUNFLOWER	**4,580**	**4,903**	**5,701**	**6,311**	**6,281**	**6,600**	**7,429**	**7,651**	**7,607**	**7,575**	**6,464**
CASTOR	**0**	**0**	**0**	**0**	**0**						**0**
COFFEE	**671,937**	**592,483**	**1,673,849**	**555,034**	**518,963**	**574,992**	**1,192,576**	**34,096**	**1,400,012**	**2,591,621**	**980,556**
PAPRIKA		**2,575**	**12,465**	**20,903**	**5,046**	**2,862**	**4,309**	**4,749**	**4,263**	**4,287**	**6,146**
CHILLIES	**7,011**	**5,174**	**4,897**	**4,145**	**3,187**	**3,735**	**6,530**	**3,006**	**2,115**	**2,968**	**4,277**
CASSAVA	**166,125**	**180,758**	**198,470**	**101,408**	**110,196**	**154,945**	**153,687**	**163,598**	**172,539**	**183,014**	**158,474**
S. POTATOES	**150,120**	**163,524**	**187,897**	**84,930**	**113,586**	**147,519**	**128,982**	**132,461**	**147,985**	**159,227**	**141,623**
I. POTATOES	**13,900**	**14,310**	**22,786**	**25,804**	**30,338**	**33,053**	**35,439**	**40,601**	**40,191**	**45,816**	**30,224**

Note: Cashew, Macadamia, Castor, and Coffee are number of trees, not hectarage
Source: 2007/08 Annual Agricultural Statistical Bulletin,Planning Department, MoAFS

A5-3 (2/3) National Smallholder Crop Estimate (Production)

CROP	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	Average
	ton	ton	ton	ton	ton	ton	ton	ton	ton	ton	ton
MAIZE	**2,245,824**	**2,290,018**	**1,589,437**	**1,621,387**	**2,055,741**	**1,608,348**	**1,225,234**	**2,903,485**	**3,226,418**	**2,634,701**	**2,140,059**
Local	764,457	793,620	673,792	556,359	581,467	493,321	398,327	573,593	599,304	484,729	591,897
Composite	71,412	182,630	282,149	289,592	379,623	388,717	330,879	982,984	1,248,168	1,037,394	519,355
Hybrid	1,331,678	1,313,768	633,496	639,321	886,377	726,310	496,028	1,054,909	1,378,946	1,112,578	957,341
Winter Crop	78,277	0	0	136,115	208,274	0	0	291,999	0	0	71,467
RICE	**99,263**	**71,601**	**94,357**	**94,186**	**88,155**	**49,694**	**41,270**	**91,450**	**113,166**	**114,885**	**85,803**
Local	13,746	18,975	44,085	42,391	41,098	22,832	16,254	44,518	54,982	49,797	34,868
Faya	53,644	34,957	27,434	33,008	25,363	14,940	15,578	16,496	19,004	18,238	25,866
B. bonnet	8,168		0	0	0						817
IET'4094	10,010	10,351	3,340	1,187	2,539	1,381	1,198	1,768	2,702	1,869	3,635
IR'1561	7,265										727
Mutupatupa			426			11	145	654	1,864	1,067	417
TCG 10	0	532	3,340	5,812	6,028	2,800	778	5,632	5,040	6,011	3,597
Pusa		2,824	11,837	7,690	10,811	4,623	2,701	10,230	12,484	13,873	7,707
Kilombero	0	61	95	422	2,316	1,543	4,230	12,152	17,090	24,030	6,194
Cert. Seed		79									8
Winter Crop	6,430	3,822	3,800	3,676		1,564	386				1,968
GROUNDNUTS	**124,604**	**116,551**	**147,729**	**150,604**	**179,326**	**153,414**	**141,078**	**203,071**	**261,810**	**243,215**	**172,140**
TOBACCO	**84,549**	**78,675**	**82,544**	**89,401**	**94,312**	**106,187**	**93,598**	**121,600**	**306,351**	**160,238**	**121,746**
NDDF	10,623	10,657	4,509	5,026	7,485	6,839	1,975	2,836	192,372	3,191	24,551
SDDF	1,116	62	468	697	1,825	1,571	193	294	192	178	660
Flue cured			32	54	54	708	2,976	4,598	6,414	7,725	2,256
Sun-air	596	572							64	55	129
Low nitro somine	51	462									
Oriental	473	959	1,414	819	745	495	391	561			586
Burley	71,690	65,963	76,121	82,805	84,203	96,574	88,063	113,311	107,309	149,089	93,513
COTTON	**51,321**	**34,907**	**36,742**	**38,827**	**40,039**	**53,581**	**50,363**	**58,569**	**63,290**	**76,761**	**50,440**
WHEAT	**1,655**	**1,815**	**2,241**	**1,520**	**1,502**	**1,666**	**1,730**	**2,000**	**4,605**	**2,386**	**2,112**
SORGHUM	**41,401**	**36,799**	**36,806**	**39,155**	**45,438**	**40,905**	**18,175**	**54,309**	**63,698**	**61,999**	**43,869**
MILLET	**20,224**	**19,508**	**20,414**	**20,900**	**24,615**	**17,349**	**15,970**	**27,037**	**32,251**	**31,869**	**23,014**
PULSES	**222,757**	**228,473**	**296,260**	**281,593**	**280,119**	**222,199**	**199,392**	**320,922**	**374,823**	**353,511**	**278,005**
Beans	55,870	73,333	106,924	99,828	101,842	76,964	85,759	117,808	128,632	124,702	97,166
Pigeon peas	118,199	99,036	105,518	105,105	116,892	93,084	63,883	130,987	159,365	149,873	114,194
Grams	1,820	1,611	2,202	2,245	2,488	1,723	661	849	1,042	868	1,551
Soya beans	39,675	46,915	35,900	29,568	38,745	33,758	40,396	55,248	67,332	60,214	44,775
Vevet beans			8,981	10,115	9,089	7,650	4,382	6,583	7,142	6,694	6,064
Ground beans	7,193	7,578	8,487	7,735	8,985	7,300	4,178	8,480	10,347	10,375	8,066
Pure stand			7,408	7,675							1,508
Interplanted			19,221	17,511							3,673
Chick peas			1,619	1,811	2,078	1,720	133	967	963	785	1,008
GUAR BEANS	**3,653**	**3,976**	**3,358**		**10**						**1,100**
CASHEW	**142**	**192**	**535**	**744**	**232**			**50**	**283**	**382**	**256**
MACADAMIA	**286**	**667**	**306**	**3,732**	**1,094**	**3**	**232**	**96**	**35**	**6,010**	**1,246**
SESAME	**836**	**866**	**849**	**927**	**886**	**714**	**546**	**719**	**1,128**	**2,159**	**963**
SUNFLOWER	**2,441**	**2,997**	**3,593**	**4,107**	**3,868**	**3,660**	**2,672**	**5,430**	**5,910**	**5,745**	**4,042**
CASTOR	**0**	**0**	**0**	**0**	**0**						**0**
COFFEE	**434**	**988**	**2,764**	**510**		**455**	**1,181**	**2,091**	**1,403**	**1,123**	**1,095**
PAPRIKA			**5,972**	**8,836**	**1,561**	**837**	**1,218**	**2,127**	**1,808**	**2,148**	**2,451**
CHILLIES	**3,307**	**2,218**	**2,340**	**1,961**	**1,691**	**1,678**	**1,477**	**1,445**	**1,109**	**1,574**	**1,880**
CASSAVA	**895,420**	**2,757,186**	**3,313,126**	**1,512,792**	**1,703,355**	**2,532,079**	**2,197,640**	**2,832,141**	**3,238,943**	**3,491,183**	**2,447,387**
S. POTATOES	**1,680,303**	**1,877,032**	**2,528,790**	**1,054,829**	**1,485,391**	**1,762,034**	**1,081,463**	**1,781,595**	**2,264,969**	**2,320,696**	**1,783,710**
I. POTATOES	**160,088**	**160,251**	**323,217**	**348,975**	**398,806**	**420,590**	**404,420**	**527,831**	**593,842**	**673,122**	**401,114**

Source: 2007/08 Annual Agricultural Statistical Bulletin,Planning Department, MoAFS

A5-3 (3/3) National Smallholder Crop Estimate (Yield)

CROP	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	Average
	ton/ha	ton/ha	ton/ha	ton/ha	ton/ha	ton/ha	ton/ha	ton/ha	ton/ha	ton/ha	ton/ha
MAIZE	**1.64**	**1.60**	**1.10**	**1.03**	**1.23**	**1.07**	**0.81**	**1.61**	**2.00**	**1.65**	**1.37**
Local	0.82	1.00	0.99	0.74	0.76	0.68	0.52	0.88	1.05	0.87	0.83
Composite	1.57	1.69	1.36	1.25	1.37	1.16	0.89	1.80	2.14	1.77	1.50
Hybrid	2.61	2.49	1.91	1.72	1.94	1.71	1.33	2.49	2.95	2.47	2.16
Winter Crop	1.66			1.77	1.80			2.10			1.83
RICE	**2.23**	**1.64**	**1.86**	**1.67**	**1.62**	**1.17**	**0.84**	**1.74**	**1.95**	**1.82**	**1.65**
Local	1.17	1.18	1.33	1.18	1.19	0.83	0.48	1.41	1.60	1.38	1.18
Faya	1.95	1.83	2.33	2.01	1.83	1.45	1.53	1.80	1.86	1.85	1.84
B. bonnet											
IET'4094	6.63	3.95	5.83	3.18	3.46	4.55	4.29	2.79	7.79	n.a	4.72
IR'1561	5.29										5.29
Mutupatupa			4.79			0.88	2.54	3.83			3.01
TCG 10		1.00	4.37	5.18	3.65	2.42	1.70	4.50			3.26
Pusa		1.00	4.16	4.21	3.98	2.76	2.29	3.49	0.80	0.45	2.57
Kilombero		3.81	4.13	1.99	2.25	1.60	1.31	1.74			2.40
Cert. Seed		6.08									6.08
Winter Crop	2.91										2.91
GROUNDNUTS	**0.73**	**0.69**	**0.82**	**0.76**	**0.82**	**0.74**	**0.57**	**0.83**	**1.01**	**0.91**	**0.79**
TOBACCO	**0.73**	**0.83**	**0.72**	**0.73**	**0.74**	**0.78**	**0.66**	**0.89**	**0.99**	**0.99**	**0.81**
NDDF	0.48	0.56	0.42	0.41	0.46	0.46	0.38	0.53	0.57	0.56	0.48
SDDF	0.58	0.06	0.53	0.65	0.74	0.71	0.27	0.62	0.65	0.67	0.55
Flue cured			0.76	0.75	0.73	0.73	0.82	1.04	1.22	1.29	0.92
Sun-air	0.45	0.59							0.63	0.66	0.58
Low nitro somine	0.73										0.73
Oriental	0.43	0.52	0.43	0.43	0.45	0.43	0.45	0.52			0.46
Burley	0.80	0.90	0.77	0.78	0.79	0.83	0.67	0.91	1.00		0.83
COTTON	**0.97**	**0.87**	**0.78**	**0.85**	**0.93**	**0.95**	**0.57**	**0.94**	**1.04**	**1.10**	**0.90**
WHEAT	**0.79**	**0.80**	**0.90**	**0.56**	**0.56**	**0.79**	**0.87**	**1.21**	**2.30**	**1.61**	**1.04**
SORGHUM	**0.70**	**0.67**	**0.68**	**0.72**	**0.76**	**0.65**	**0.27**	**0.77**	**0.86**	**0.83**	**0.69**
MILLET	**0.60**	**0.57**	**0.60**	**0.61**	**0.64**	**0.46**	**0.39**	**0.65**	**0.72**	**0.72**	**0.60**
PULSES	**0.55**	**0.56**	**0.59**	**0.55**	**0.58**	**0.50**	**0.39**	**0.63**	**0.68**	**0.74**	**0.58**
Beans	0.42	0.44	0.50	0.44	0.44	0.38	0.37	0.49	0.49	0.48	0.45
Pigeon peas	0.94	0.72	0.78	0.75	0.79	0.67	0.41	0.87	0.99	0.89	0.78
Grams	0.03	0.03	0.56	0.56	0.57	0.47	0.28	0.50	0.53	n.a	0.39
Soya beans	0.62	0.23	0.68	0.65	0.78	0.72	0.59	0.77	0.03	0.03	0.51
Vevet beans			0.89	0.91	0.79	0.65	0.46	0.75	0.12	0.10	0.58
Ground beans	0.62	0.10	0.64	0.59	0.65	0.56	0.45	0.61	0.46	0.41	0.51
Pure stand			0.52	0.46							0.49
Interplanted			0.38	0.32							0.35
Chick peas			0.56	0.61	0.58	0.54	0.06	0.53	0.60	n.a	0.50
GUAR BEANS	**1.18**	**0.41**	**0.75**		**1.00**						**0.84**
CASHEW	**7.00**	**8.00**	**2.00**	**10.00**	**3.00**			**2.00**	**6.00**	**2.00**	**6.67**
MACADAMIA	**15.00**		**14.00**			**3.00**	**3.00**		**6.00**	**2.00**	**7.17**
SESAME	**0.43**	**0.41**	**0.42**	**0.41**	**0.42**	**0.32**	**0.19**	**0.41**			**0.38**
SUNFLOWER	**0.83**	**0.61**	**0.63**	**0.65**	**0.62**	**0.56**	**0.36**	**0.71**	**0.78**	**n.a**	**0.64**
CASTOR	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**						**0.00**
COFFEE	**1.00**	**2.00**	**2.00**	**1.00**		**1.00**	**1.00**				**1.33**
PAPRIKA			**0.48**	**0.42**	**0.31**	**0.29**	**0.28**	**0.45**	**0.45**	**n.a**	**0.38**
CHILLIES	**0.47**	**0.43**	**0.48**	**0.47**	**0.53**	**0.45**	**0.23**	**0.48**			**0.44**
CASSAVA	**5.39**	**15.25**	**16.69**	**14.92**	**15.46**	**16.34**	**14.30**	**17.31**	**18.78**	**n.a**	**14.94**
S. POTATOES	**11.19**	**11.48**	**13.46**	**12.42**	**13.08**	**11.94**	**8.39**	**13.45**	**12.00**	**13.00**	**12.04**
I. POTATOES	**11.52**	**11.20**	**14.16**	**13.52**	**13.15**	**12.73**	**11.41**	**13.00**	**13.43**	**n.a**	**12.68**

Note:Yields of Cashew, Macadamia, Castor, and Coffee are kg per tree

Source: 2007/08 Annual Agricultural Statistical Bulletin,Planning Department, MoAFS(The data for 2006/07 and 2007/08 include the revised data from MOAFS)

A5-4 (1/2) Result of Chemical Analysis (Windrow Compost)

Site/Sample	Moisture Content (%)	Bulk Density (g/cu. Cm)	Ph	Carbon (%)	Organic Matter	Extractable Phosphorus (%)	Extractable potassium (%)	Calcium (%)	Total Nitrogen (%)	Remarks
Chiwoza										
Northern	21.93	1.55	8.77	28.20	41.70	0.82	2.17		2.40	
South west	21.66	1.59	9.04	51.30	88.50	0.79	1.95		4.40	
East	22.57	1.58	8.91	24.20	41.70	0.92	1.58		2.10	
Average	**22.05**	**1.57**	**8.91**	**34.57**	**57.30**	**0.84**	**1.90**		**2.97**	
Kachere										
Eastern	36.61	1.45	8.83	41.00	70.70	0.65	1.76		3.50	
Western	38.19	1.46	8.72	22.10	38.20	0.82	1.47		1.90	
Middle	38.79	1.43	8.74	42.60	73.50	0.89	1.69		3.70	
Average	37.86	1.45	8.76	35.23	60.80	0.79	1.64		3.03	
Titukulane										
Eastern	35.84	1.49	8.90			3.63	0.83	0.07	1.90	
Central	37.71	1.50	9.00			3.60	0.83	0.06	1.90	
Southern	44.69	1.51	8.90			3.59	0.84	0.08	1.80	
Average	**39.41**	**1.50**	**8.93**			**3.61**	**0.83**	**0.07**	**1.87**	
Bawi (Weir No. 7)										
Western	44.03	1.62	8.90			3.53	0.84	0.08	1.90	
Eastern	46.55	1.60	8.80			3.55	0.83	0.09	1.80	
Central	41.98	1.59	8.90			3.50	0.84	0.08	1.80	
Average	**44.19**	**1.60**	**8.87**			**3.53**	**0.84**	**0.08**	**1.83**	
Bethani										
Central	56.38	1.25	8.20	35.40	61.10	1.00			3.30	
Northern	49.61	1.29	8.20	36.00	62.00	0.97			3.60	
Southern	54.78	1.31	8.10	29.00	51.00	0.93			3.20	
Average	53.59	1.28	8.17	33.47	58.03	0.97			3.37	
Bawi (Weir No.5)										Less application of animal dung, leguminous crop residue may affect the low nitrogen content.
Eastern	31.23	1.18	9.60	42.29	70.29	2.14	0.52	0.03	0.37	
Central	35.42	1.16	9.90	55.46	69.56	2.96	0.64	0.02	0.48	
West	37.14	1.17	9.60	57.86	72.97	3.49	0.53	0.03	0.50	
Average	34.60	1.17	9.70	51.87	70.94	2.86	0.56	0.03	0.45	
Chibwana										Thin layer of rice straw was covered instead of plastic film and it was burn by fire about a week after making the compost. Then dryness of the materials disturbed the decomposition.
Central	40.02	1.12	8.80	58.25	60.04	0.60	0.43	0.02	0.50	
Western	18.27	1.15	8.80	37.51	67.47	0.66	0.39	0.02	0.32	
Eastern	45.00	1.13	8.70	62.24	65.73	0.86	0.43	0.02	0.54	
Average	34.43	1.14	8.77	52.67	64.41	0.71	0.42	0.02	0.45	
60 days after first sampling	30.22	1.20	9.20	14.13	25.38	0.79	0.38	0.03	0.44	
Chaseta										
South	23.41	1.11	8.70	16.22	29.2	0.92	0.22		1.57	
Central	21.43	1.08	8.90	20.00	36.00	0.99	0.31		1.8	
North	22.39	1.07	8.90	23.43	42.17	0.96	0.25		2.11	
Average	**22.41**	**1.08**	**8.80**	**19.80**	**35.79**	**0.96**	**0.26**		**1.83**	
Average of bold figures	**32.02**	**1.44**	**8.88**	**13.59**	**23.27**	**2.24**	**0.96**	**0.04**	**2.13**	

Note :The blank data means that analysis was not conducted due to non-availability of the related reagents.
Source :JICA Study Team

A5-4 (2/2) Result of Chemical Analysis (Liquid Bocashi and Liquid Manure)

No.	Sample	pH	N (%)	P (%)	K (%)
1	Liquid Bocashi, RUSAGU No 1	7.5	0.42	0.05	0.78
2	Liquid Bocashi, RUSAGU No 2	7.2	0.31	0.05	0.64
3	Liquid Bocashi, RUSAGU No 3	7.7	0.19	0.04	0.59
4	Liquid Bocashi, Titukulane	5.5	0.33	0.05	0.90
Average		7.0	0.31	0.05	0.73
5	Liquid Manure, LOMADEF	7.4	0.20	0.04	0.46
6	Drain water from cow shed	7.1	0.08	0.01	0.09

Source: JICA Study Team

Table A5-5 Proposed Cropping Pattern for Verification Study Schemes

Irrigation Scheme	Cropping Pattern	(%)	1			2			3			4			5			6			7			8			9			10			11			12		
			1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
1. Bethani(22.0ha)	Maize(W)+Maize(D1)+Maize(D2)	60	Grain Maize (W)												Green Maize(D1)									Green Maize(D2)														
	Tobacco(W)+Maize(D1)+Maize(D2)	30	Tobacco (W)									Grain Maize(70%) Green Maize(30%)												Grain Maize(70%) Green Maize(30%)													
	Maize(W)+I.Potato(D1)+Onion(D2)	10	Grain Maize (W)									I. Potato (D1)												Onion (D2)													
2.Mantha (8.0ha)	Maize(W)+Maize(D1)+Maize(D2)	70	Grain Maize (W)									Grain Maize(70%) Green Maize(30%)												Grain Maize(70%) Green Maize(30%)													
	Maize(W)+Cabbage(D1)+Tomato(D2)	30	Grain Maize (W)												Cabbage(D1)									Tomato (D2)													
3. Kachere(6.4ha)	Maize(W)+Maize(D)	75	Grain Maize (W)																					Grain Maize(50%) Green Maize(50%)													
	Maize(W)+Cabbage(D1)+Tomato(D2)	25	Grain Maize (W)												Cabbage (D1)									Tomato(D2)													
4. Chiwoza Dam (10.0ha)	Maize(W)+Green Maize(D1)+Green Maize(D2)	40	Grain Maize (W)												Green Maize(D1)									Green Maize(D2)													
	Maize(W)+Cabbage(D1)+Tomato(D2)	40	Grain Maize (W)												Cabbage (W1)									Tomato(W2)													
	Maize(W)+Paprika (D)	20	Grain Maize (S)													Paprika																						
5. Titukulane (7.0ha)	Maize(W)+Green Maize(D1)+Green Maize(D2)	50	Grain Maize (W)												Green Maize(D1)									Green Maize(D2)													
	Tomato(W)+Carrot(D1)+Green Maize(D2)	20	Grain Maize (W)										Carrot(D1)									Green Maize(D2)										Tomato					
	Maize(W)+Cabbege(D1)+Tomato(D2)	30	Grain Maize (W)												Cabbege (D1)									Tomato (D2)													
6.Chaseta (12.0ha)	Maize(W)+Beans(D1)+Green Maize(D2)	60	Grain Maize (W)												Beans(D1)									Green Maize(D2)													
	Maize(W)+Cabbage(D1)+Tomato(D2)	40	Grain Maize (W)												Cabbaege (D1									Tomato (D2)													
7. Bawi(6.3ha)	Maize(W)+Green Maize(D1)+Green Maize(D2)	60	Grain Maize (W)												Green Maize(D1)									Green Maize(D2)													
	Maize(W)+Cabbage(D1)+Tomato(D2)	30	Grain Maize (W)												Cabbege (D1)									Tomato (D2)													
	Sugarcane,banana,etc.	10																(Throughout year)																			
	Fishculture	10																(Throughout year)																			
8. Chibwana	Rice (W)+Grain Maize (D)	90							Rice (W)															Maize (D)													
	Rice (S)+Tomato (W) (85ha)	10							Rice (W)															Tomato(D)													

Remarks: 1 Kinds of vegetables mean the representative crops including beans.
2 Growth Satge:○ Sowing ▲ Transplanting ■Harvesting W Wet Season D Dry Season
3 This pattern was prepared by Study Team through discussion with respective scheme farmers to make it reflected to water management plan.

APPENDIX 6

RURAL SOCIOLOGY AND FARMERS ORGANISATION

APPENDIX 6 RURAL SOCIOLOGY AND FARMERS ORGANISATION

Contents

Problem Tree at Mchenga Village, Mpenu EPA
Lilongwe District, Lilongwe ADD
February 23, 2007

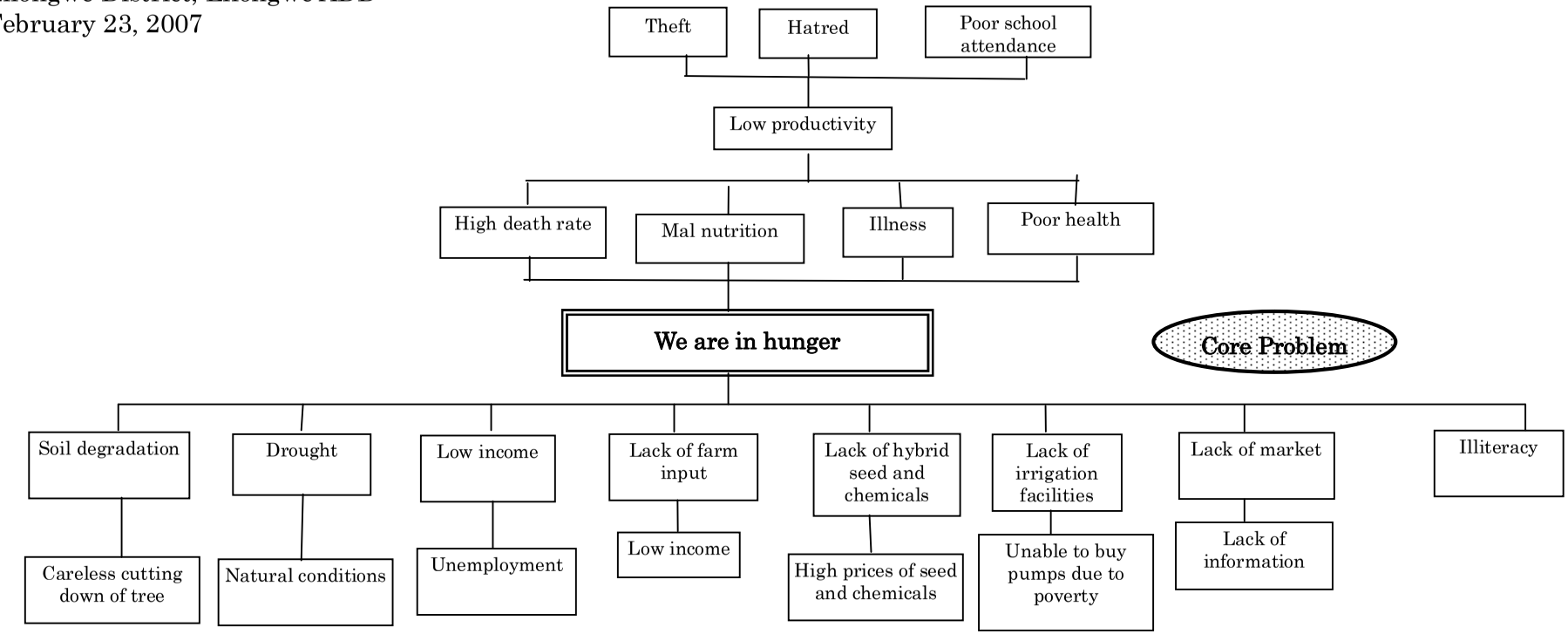


Figure A6-1 Problem Tree at Mchenga Village (Lilongwe District)

Problem Tree at Chiwoza Scheme
Chulu EPA, Kasungu District,
Kasungu ADD
February 24, 2007

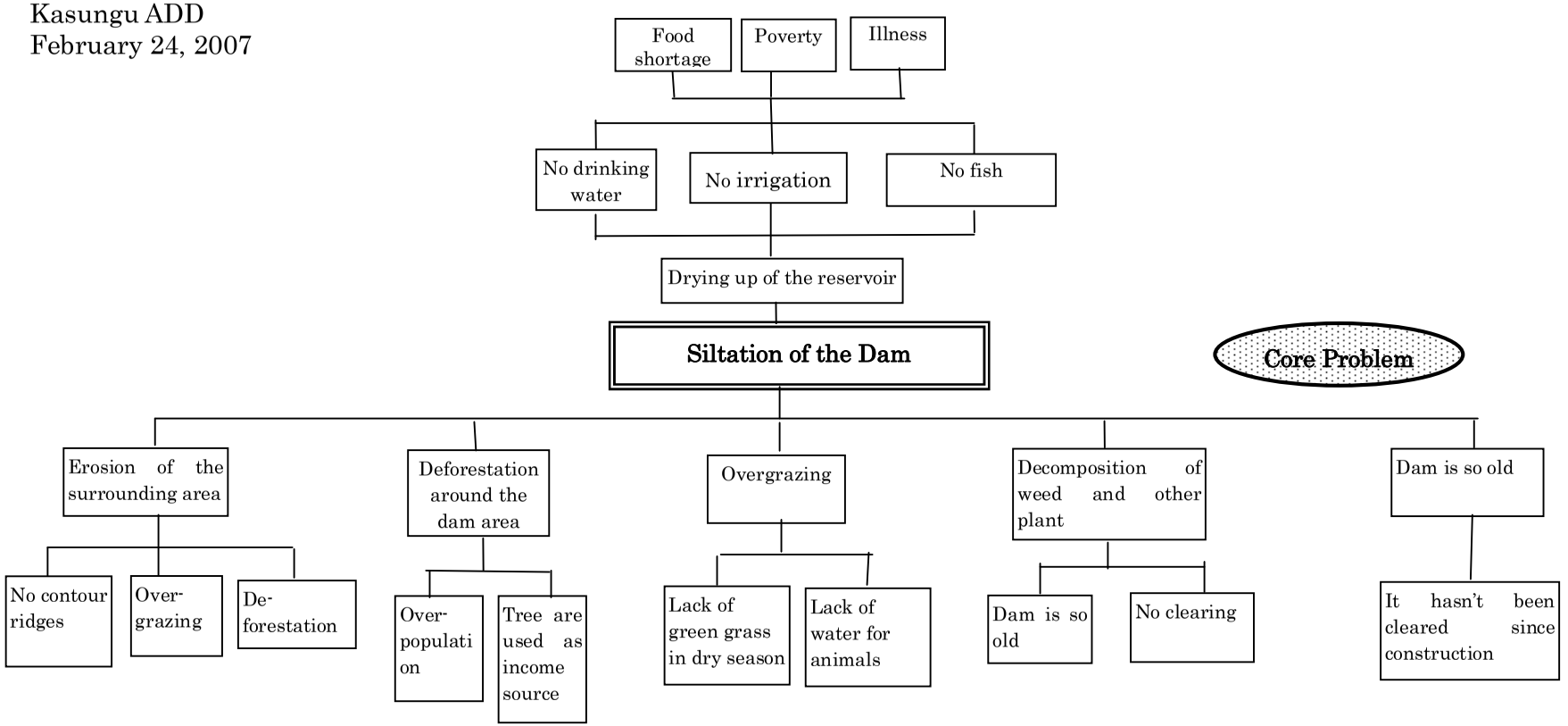


Figure A6-2 Problem Tree at Chiwoza Village (Kasungu District)

Problem Tree at Linga EPA
Nkhotakota District, Salima ADD
March 1, 2007

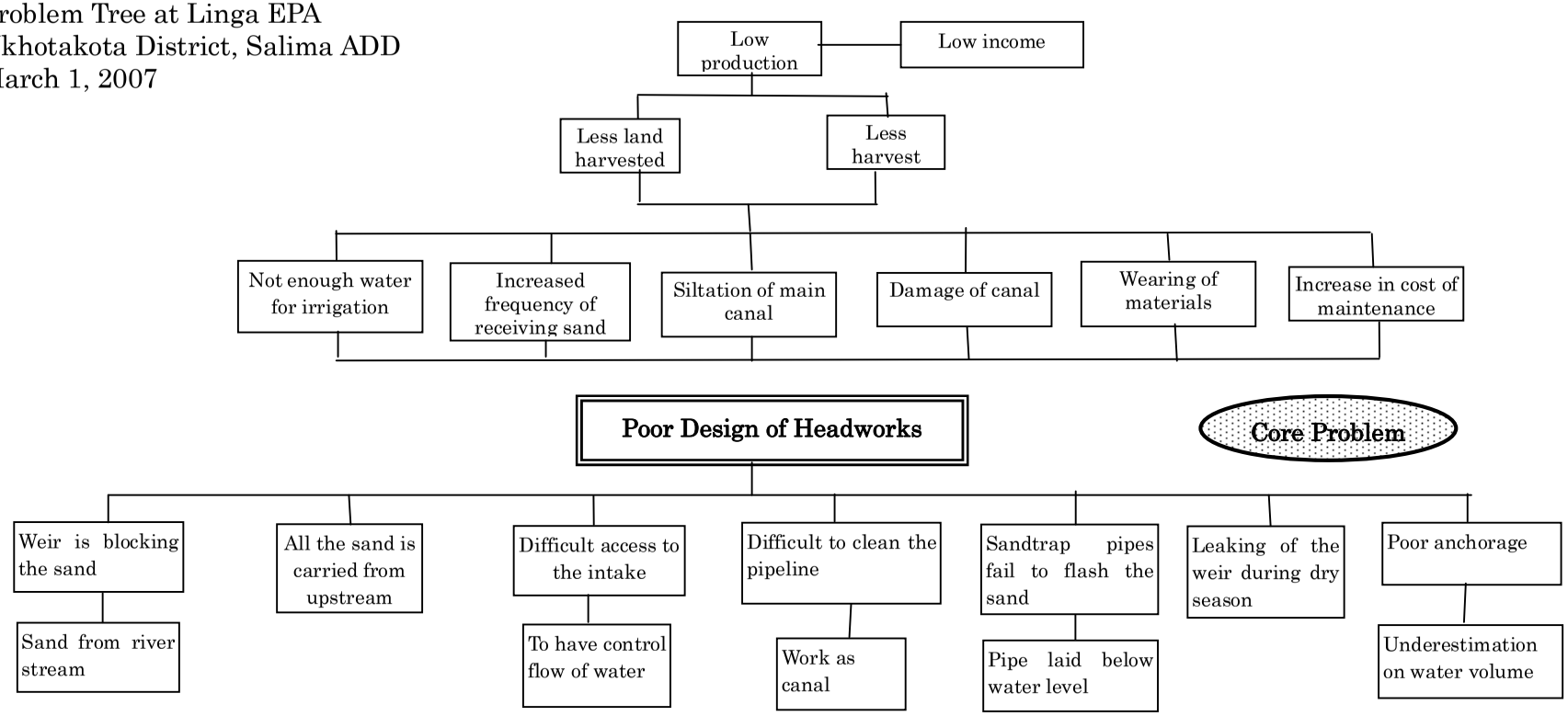


Figure A6-3 Problem Tree at Linga Village (Nkhotakota District)

Problem Tree at Bethani Scheme,
Mhuju EPA, Rumphi District, Mzuzu
ADD
March 2, 2007

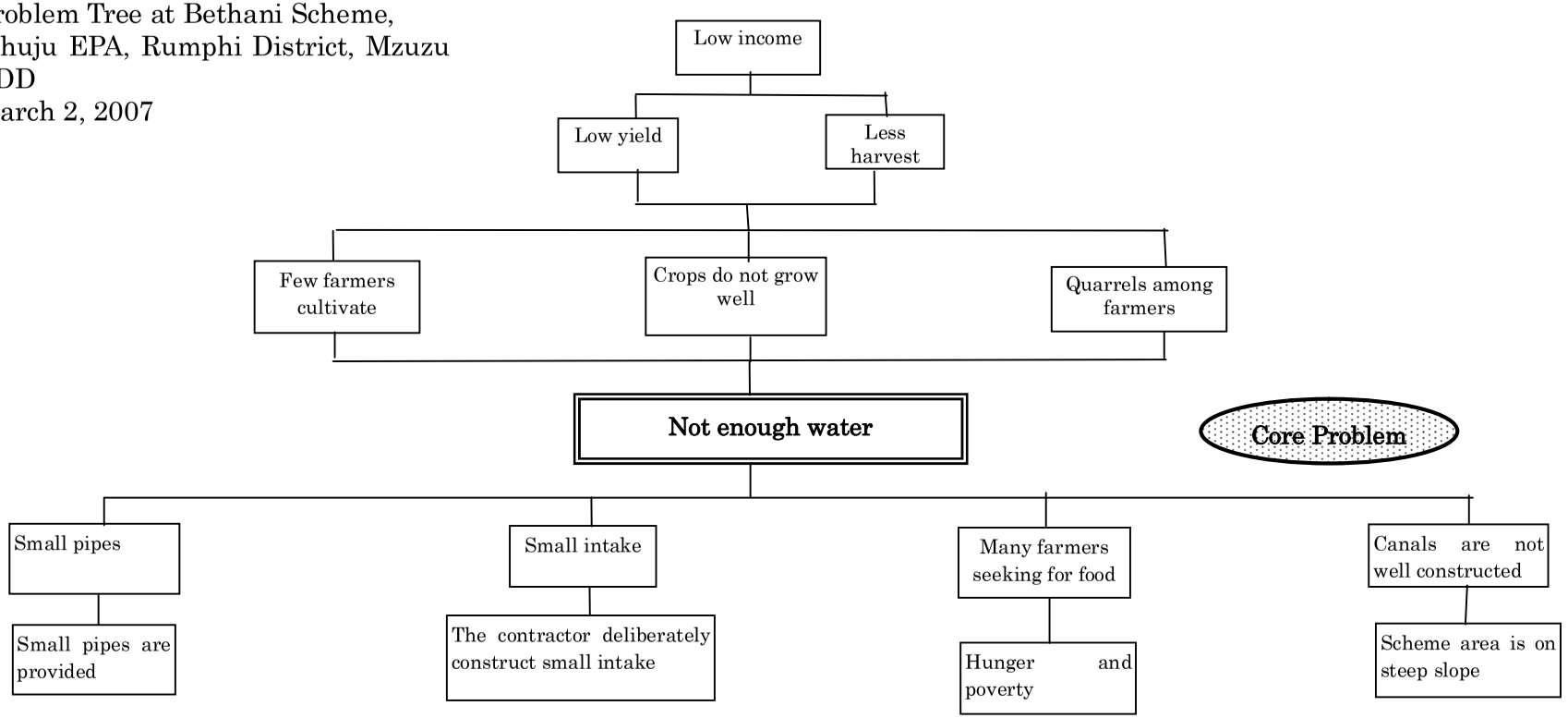


Figure A6-4 Problem Tree at Bethani Village (Rumphi District)

Problem Tree at Kasumbu Village, Kanyama EPA
Dedza District, Lilongwe ADD
February 24, 2007

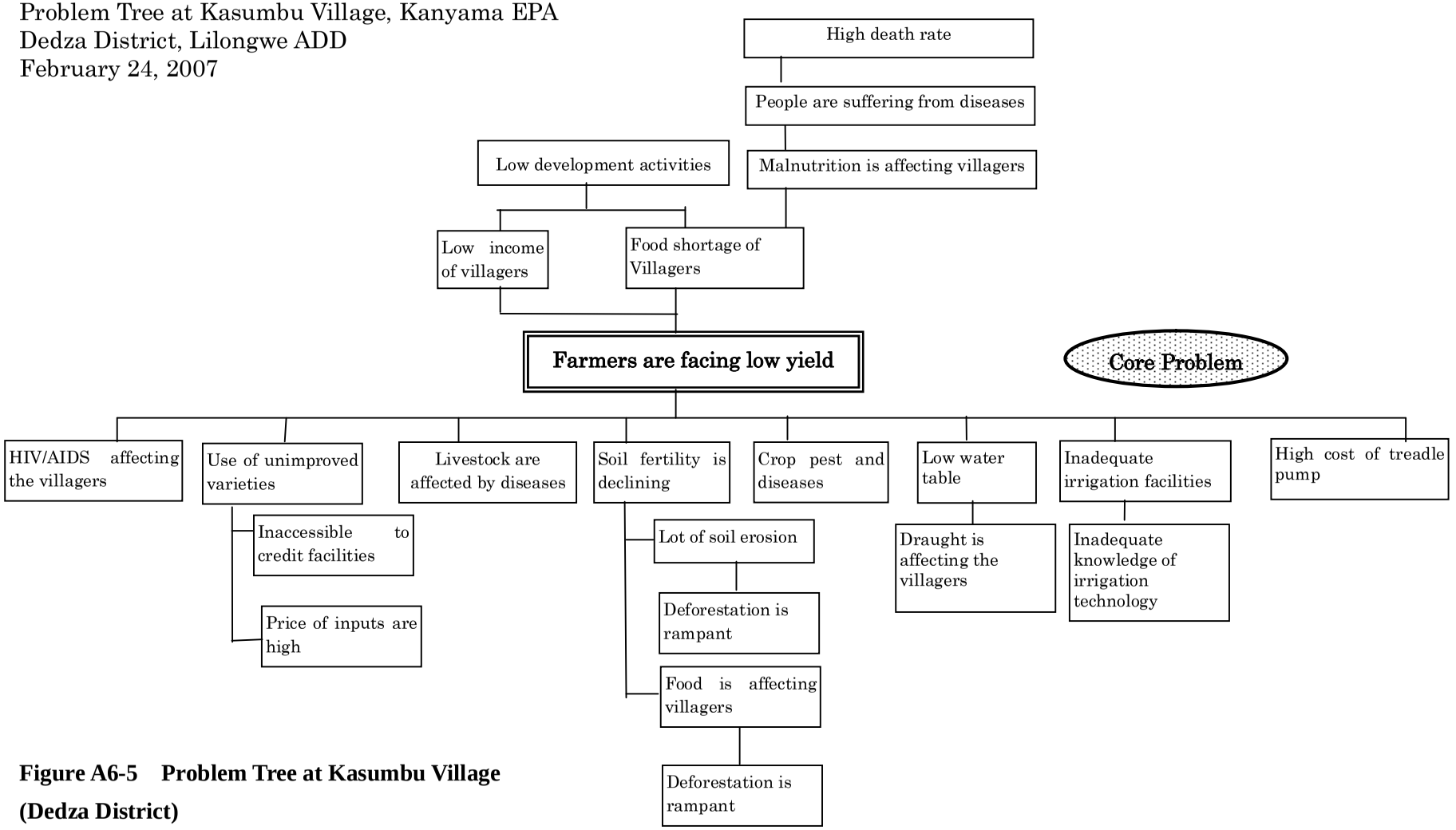


Figure A6-5 Problem Tree at Kasumbu Village (Dedza District)

Table A6-1 Assessment Criteria for River Diversion and Impounding Dam Schemes (Farmers Workshop-1)

Category	Indicators	Rating Criteria	Score
1. Farmers involvement in the existing irrigation scheme (Full score: 3)	Mode of involvement in the existing irrigation scheme	1) No contributions during the construction stage	0
		2) Contribution of labor during the construction stage	1
		3) Contribution of labor and local materials during construction stage	2
		4) Contribution of labor, local materials and construction inputs (e.g. cement) during construction	3
2. O&M management system in the existing scheme (Full score: 4)	Holding regular meetings	5) No regular meetings	0
		6) Regular meetings held	1
	Collection of membership fee	7) No membership fee collected	0
		8) Membership fee is collected	2
	Farmers involvement in maintenance works	9) No maintenance works by the members	0
		10) Maintenance works conducted by members	1
3. Willingness to share the project costs for the rehabilitation works (Full score: 3)	Positive intension to share the project costs	11) No contribution of farmers for the rehabilitation	0
		12) Labor contribution for the rehabilitation works	1
		13) Contribution of labor and local materials (stones, sands, etc.) for the rehabilitation works	2
		14) Contribution of labor, local materials and construction inputs (e.g. cement) for rehabilitation	3

Note: In case of non-functioning of the facilities, the situation at the time when functioned was considered.

Table A6-2 Assessment Criteria for Motorized Pump Schemes (Farmers Workshop-1)

Category	Indicators	Rating Criteria	Score
1. Farmers involvement in the existing irrigation scheme	Mode of involvement in the existing irrigation scheme	1) No contributions during the construction stage	0
		2) Contribution of labor during the construction stage	1
		3) Contribution of labor and local materials during construction stage	2
		4) Contribution of labor, local materials and construction inputs (e.g. cement) during construction stage	3
2. O&M management system in the existing scheme	Holding regular meetings	5) No regular meetings	0
		6) Regular meetings are held (general meeting, committee meeting, etc.)	1
	Collection of membership fee	7) No membership fee collection	0
		8) Membership fee is collected	1
	Collection of operation costs	9) Collection rate of operation cost (e.g. fuel) is/was less than 30% of the water users.	0
		10) Collection rate of operation cost (e.g. fuel) is/was 30% to 60% of the water users.	1
		10) Collection rate of operation cost (e.g. fuel) is/was more than 60% of the water users.	2
3. Willingness to share the project costs for the rehabilitation works	Positive intension to share the project costs	13) No contribution of farmers for the rehabilitation works	0
		14) Labor contribution for the rehabilitation works	1
		15) Contribution of labor and local materials (stones, sands, etc.) for the rehabilitation works	2
		16) Contribution of labor, local materials and construction inputs (e.g. cement) for rehabilitation	3

Note: In case of non-functioning of the facilities, the situation at the time when functioned was considered.

Table A6-3 Assessment Result of Candidate Irrigation Schemes for River Diversion and Impounding Dam Schemes in Farmers Wokshop-1

Category	Indicators	Rating Criteria	Point	Mz-11	Li-21	Kas-47	Sa-13	Ma-1
				Bethani	Bawi	Titukalun e	Mpamantha	Chibwana
				Rumphi D.	Ntcheu D.	Dowa D.	Salima D.	Machinga
				River D.	River D.	River D.	Dam	River D.
1. Involvemen t in the existing scheme	1-1 Mode of involvement	1. No contribution	0	-	-	-	-	-
		2. Contribution of labor	1	-	-	-	✓	
		3. Contribution of labor and local materials	2	✓	✓	✓	-	-
		4. Contribution of labor, local materials and construction inputs	3	-	-	-	-	✓ (Contributi on of some cement)
		(Score)		2.0	2.0	2.0	1.0	2.5
2. O&M managemen t system in the existing scheme	2-1 Holding regular meeting	5. No regular meeting		-	-	-	-	-
		6. Held regular meeting		✓	✓	✓	✓	✓
	2-2 Collection of membership fee	7. No membership fee collection		-	-	-	-	-
		8. Collected membership fee		✓	✓	✓	✓	✓
	2-3 Maintenance work by members	9. No maintenance work by members		-	-	-	-	-
		10. Conducted maintenance work		✓	✓	✓	✓	✓
		(Score)		4.0	4.0	4.0	4.0	4.0
3. Willingness to share the project costs for rehabilitatio n works	3-1 Positive intension to cost sharing 1/	11. No contribution	0	-	-	-	-	-
		12. Contribution of labor	1	-	-	-	-	-
		13. Contribution of labor and local materials	2	-	✓	-	✓	-
		14. Contribution of labor, local materials and construction inputs	3	✓ (Contributi on of some cement)	-	✓ (Contributi on of some cement)	-	✓ (Contributi on of some cement)
		(Score)		2.5	2.0	2.5	2.0	2.5
		Total Score	10	8.5	8.0	8.5	7.0	9.0
		Judgment		Good	Good	Good	Fair	Good

Note: 1/ Contribution of a part of construction inputs was rated at 2.5 instead of 3.0.

Table A6-4 Assessment Result of Candidate Irrigation Schemes for Motorized Pump Scheme in Farmers Workshop-1

Category	Indicators	Rating Criteria	Point	Mz-4	Kas-40	Kas-46	Li-2	Ma-14
				Mantha	Kachere	Chiwoza Dam	Chaseta	Nsenjera
				Mzimba D.	Kasungu D.	Kasungu D.	Lilongwe D.	Mangochi
				Pump	Pump	Dam and Pump	Pump	Pump
1. Involvement in the existing scheme	1-1 Mode of involvement	1. No contribution	0	-	-	-	-	-
		2. Contribution of labor	1	✓	✓	-	-	-
		3. Contribution of labor and local materials	2	-	-	✓	✓	-
		4. Contribution of labor, local materials and construction inputs	3	-	-	-	-	✓ (Contribution of some cement)
		(Score)		1.0	1.0	2.0	2.0	2.5
2. O&M management system in the existing scheme	2-1 Holding regular meeting	5. No regular meeting	0	-	-	-	-	-
		6. Held regular meeting	1	✓	✓	✓	✓	✓
	2-2 Collection of membership fee	7. No membership fee collection	0	-	-	-	-	-
		8. Collected membership fee	1	✓	✓	✓	✓	✓
	2-3 Collection of pump operation costs	9. Collection rate is less than 30%	0	-	-	-	-	-
		10. Collection rate of 30% to 60%	1	✓	-	-	-	-
		11. Collection rate is more than 60%	2	-	✓	✓	✓	✓
		(Score)		3.0	4.0	4.0	4.0	4.0
3. Willingness to share the project costs for rehabilitation works	3-1 Positive intension to cost sharing	12. No contribution	0	-	-	-	-	-
		13. Contribution of labor	1	-	-	-	-	-
		14. Contribution of labor and local materials	2	-	-	-	✓	-
		15. Contribution of labor, local materials and construction inputs 1/	3	✓ (Contribution of some cement)	✓ (Contribution of some cement)	✓ (Contribution of some cement)	-	✓ (Contribution of some cement)
		(Score)		2.5	2.5	2.5	2.0	2.5
		Total Score	10	6.5	7.5	8.5	8.0	9.0
		Judgment		Fair	Fair	Good	Good	Good

Note: 1/ Contribution of a part of construction inputs was rated at 2.5 instead of 3.0.

Table A6-5 List of Committee Members in 8 Verification Schemes (as of June, 2008)

Scheme	Committee	Position	Name
1. Bethani	Management	Chairman	Samson Nyirengo
		Vice Chairman	Geofrey Chione
		Treasurer	Brenda Chawinga
		Secretary	Abraham Mtete
	Bethani-A	Chairman	Voster Nyirongo
		Secretary	Clement Nyirongo
		Vice Secretary	Russy Mtete
		Treasurer	Austine Nyirongo
		Vice Treasurer	Richard Mtete
		Committee member	Misozi Phiri
		Committee member	Tafwilapo Gondwe
		Committee member	Mary Gondwe
		Committee member	Benias Nyirongo
		Committee member	Rachelo Gondwe
	Bethani-B	Chairman	BSC Gondwe
		Secretary	Abraham Mtete
		Treasurer	Henery Gondwe
		Committee member	Titus Mwandira
		Committee member	Rodgers Mtete
		Committee member	Obrey Chawinga
2. Mantha	Management	Chairman	Herbert Matundu
		Vice Chairman	Christopher Moyo
		Secretary	Chiukepo Matundu
		Vice Secretary	James Matundu
		Treasurer	Mercent Nkhamble
		Committee member	Ireen Phiri
		Committee member	Esau Matundu
		Committee member	Zione Chirwa
		Committee member	Merci Musi
		Committee member	Anthony Matundu
3. Chiwoza Dam	Management	Chairman	Gift Muyayi
		Vice Chairman	Edina Banda
		Secretary	Frank Phiri
		Vice Secretary	Grace Zimba
		Treasurer	Newsted Zgala
		Committee member	Enita Masamba
		Committee member	Justina Mwale
		Committee member	Enock Binga
		Committee member	Baziwelo Kamanga
		Committee member	Ruphine Phiri
4. Kachere	Management	Chairman	Restford Phiri
		Vice Chairman	Mateo Bwankhu
		Secretary	Henry Phiri
		Vice Secretary	Christopher Banda
		Treasurer	Mency Moyo
		Vice Treasurer	Velinasi Zuwayumo
		Committee member	Njovu Mwale
		Committee member	Robert Mwale
		Committee member	Lozina Mwale
		Committee member	Velina Banda
		Committee member	Etherine Phiri
		Committee member	Elisa Phiri

5. Titukulane	Management	Chairman	Goliati Nyoswe
		Secretary	Kabukonde Chimcheka
		Committee member	Positi Kwapa
		Committee member	Benison Ngawa
6. Chaseta	Management	Chairman	Charles Mbewe
		Vice Chairman	B.B. Samuele
		Vice Secretary	Eunice Chimalira
		Treasurer	Zindani Zinchetera
7. Bawi	Management	Chairman	Alex Juwao (weir #4)
		Secretary	J. Simson (weir #5)
		Treasurer	L. Machaka (weir #)
	Weir #5	Chairman	Phillip Manuglenje
		Secretary	Elisi Simon
		Treasurer	Sabiona Kacheya
	Weir #7	Chairman	Brighton Chimbayo
		Vice Chairman	Patrick Jana
		Secretary	Vaida Zondani
		Treasurer	Moyenda Chirwa
8. Chibwana	Management	Chairman	Nicks Tapwana
		Vice Chairman	Ethel James
		Secretary	Joseph Phiri
		Vice Secretary	Manas Kawalala
		Treasurer	Chimwewe Tiyesi
		Committee member	Wisk Mayadi
		Committee member	Jafalie Malowa
		Committee member	Dorothy Mdala
		Committee member	Patuma Jawadu
		Committee member	Ajison Banda

Table A6-6 Names of Chiefs in Malawi

	District	Paramount Chief	Senior Chief	Chief	Sub-Chief
1	Karonga				
	Section 1		Kyungu		
	Section 2			Wasambo	
	Section 3			Kilupula	
	Section 4			Karonga	
	Section 5			Mwirang'ombe	
	Section 6			Mwakaboko	
2	Chitipa				
	Section 1			Mwenemisuku	
	Section 2		Kameme		
	Section 3			Mweneweya	
	Section 4			Nthalire?	
	Section 5		Mwaulambaya		
3	Rumphi				
	Section 1		Chikulamayembe		
	Sub-section 1A				Mwahenga
	Sub-section 1B				Chapinduka
	Sub-section 1C				Kachulu
	Sub-section 1D				Chisovya
	Section 2			Katumbi	
	Sub-section 2A				Zolokere
	Section 3			Mwamlowe	
	Sub-section 3A				Njikula
	Section 4			Mwalweni	
	Section 5			Mwankhunikira	
4	Mzimba	Mbelwa IV			
	Section 1			Mtwalo	
	Sub-section 1A				Yohanejere
	Section 2			Chindi	
	Section 3			Mjikubola	
	Sub-section 3A				Jona Chiputula
	Section 4			Mabilabo (Mabulabo)	
	Sub-section 4A				Levi Jere
	Section 5			Mphrembe	
	Sub-section 5A				Chikama Mkandawire
	Section 6			Mzukuzuku	
	Section 7			Kampingo Sibande	
	Section 8			Jaraviba Mnthali	
	Section 9			Khosolo Jere	
5	Nkhata Bay				
	Section 1			M'bwana	
	Sub-section 1A				Mkandowe
	Sub-section 1B				Nyaluwanga
	Section 2			Boghogho	
	Section 3			Mankhambira	
	Sub-section 3A				Fukamalaza
	Section 4		Kabunduli		
	Section 5			Timbiri	
	Section 6			Fukamapiri	
	Section 7			Malengamzoma	
	Section 8			Mkumbira	
	Section 9			Zilakoma	
	Section 10			Malanda	
6	LIkoma				
	Section 1			Mkumpha	
7	Lilongwe				
	Section 1		Khongoni		
	Section 2			Chitukula	
	Sub-section 2A				Mbang'mbe
	Section 3			Chimutu	
	Section 4		Mazengera		
	Sub-section 4A				Chitekwere
	Section 5			Kalumbu	
	Section 6		Chadza		
	Section 7			Chiseka	
	Section 8			Kalumba	
	Section 9			Kalolo	
	Section 10			Kabudula	
	Section 11			Malili	
	Section 12			Masula	
	Section 13			Mtema	
	Section 14			Tsabango	
	Section 15			Njewa	

	District	Paramount Chief	Senior Chief	Chief	Sub-Chief
	Section 16			Masumba-nkhunda	
8	Mchinji				
	Section 1			Mkanda	
	Section 2			Zulu	
	Sub-section 2A				Simphasi
	Sub-section 2B				Nyoka
	Section 3			Mlonyeni	
	Section 4			Dambe	
	Section 5			Mduwa	
	Section 6			Mavwere	
	Section 7			Kapondo	
9	Dedza				
	Section 1			Kachere	
	Sub-section 1A				Pemba
	Section 2			Kaphuka	
	Section 3			Tambala	
	Section 4			Kasumbu	
	Section 5		Kachidamoto		
	Sub-section 5A				Kamenyegwaza
	Section 6			Chilikumwendo	
	Section 7			Chauma	
10	Dowa				
	Section 1		Dzoole		
	Sub-section 1A				Chakhaza
	Section 2			Msakambewa	
	Sub-section 2A				Mponela
	Section 3			Chiwere	
	Section 4			Kayembe	
	Section 5			Mkukula	
11	Salima				
	Section 1			Khombedza	
	Section 2			Kuluunda	
	Section 3			Maganga	
	Section 4			Karonga	
	Section 5			Pemba	
	Section 6		Ndindi		
	Section 7			Mwanza	
	Section 8			Msosa	
	Section 9			Kambwiri	
	Section 10			Kambalame	
12	Ntcheu	Gomani			
	Section 1			Kwataine	
	Section 2			Chakhumbira	
	Section 3			Njolomole	
	Section 4			Phambala	
	Sub-section 4A				Tsikulamowa
	Section 5			Mpando	
	Section 6			Masasa	
	Section 7			Makwangwala	
	Section 8			Champiti	
	Section 9			Ganya	
13	Kasungu				
	Section 1			Kaluluma	
	Sub-section 1A				M'nyanja
	Sub-section 1B				Chisikwa
	Section 2			Mwase	
	Section 3		Chulu		
	Sub-section 3A				Chinsinga
	Sub-section 3B				Mphomwa
	Section 4			Santhe	
	Sub-section 4A				Chaima
	Sub-section 4B				Nyaza
	Section 5			Wimbe	
	Sub-section 5A				Chitanthamapiri
	Sub-section 5B				Chinyama
	Section 6			Kapelula	
	Sub-section 6A				Kapichira
	Sub-section 6B				Mdunga
	Section 7		Lukwa		
	Sub-section 7A				Mawawa
	Sub-section 7B				Mangwazu
	Sub-section 7C				Kaphaizi
	Sub-section 7D				Simdemba
	Section 8		Kaomba		
	Section 9			Simlemba	

	District	Paramount Chief	Senior Chief	Chief	Sub-Chief
	Section 10			Kawamba	
	Sub-section 10A				Nthunduwala
	Section 11			Chilowamatambe	
	Sub-section 11A				Chambwe
	Section 12			Njombwa	
	Section 13			Chidzuma	
	Section 14			Chisemphere	
14	Nkhotakota				
	Section 1		Kanyenda		
	Section 2			Malengachanzi	
	Section 3			Mwadzama	
	Section 4			Kafuzila	
	Section 5			Mphonde	
	Section 6			Mwansambo	
15	Ntchisi				
	Section 1			Kasakula	
	Section 2			Chikho	
	Section 3			Kalumo	
	Section 4			Nthondo	
	Section 5			Chilooko	
	Section 6			Malenga	
	Section 7			Vuso Jere	
16	Nsanje				
	Section 1			Mloro	
	Section 2		Tengani		
	Section 3			Chimombo	
	Section 4			Ndamera	
	Section 5			Nyachikadza	
	Section 6			Malemia	
	Section 7			Ngabu	
	Section 8			Mbenje	
	Section 9			Makoko	
17	Chikwawa	Lundu			
	Section 1			Ngabu	
	Section 2		Chapananga		
	Sub-section 2A				Ndakwera
	Section 3			Makhuwira	
	Section 4			Kasisi	
	Section 5			Katunga	
	Section 6			Maseya	
	Section 7			Ngowe	
	Sub-section 7A				Masache
	Section 8			Mlilima	
18	Thyolo				
	Section 1		Nsabwe		
	Sub-section 1A				Thukuta
	Sub-section 1B				Mbawela
	Section 2			Changata	
	Sub-section 2A				Kwetemula
	Section 3			Kapichi	
	Section 4			Nchilamwera	
	Section 5			Chimaliro	
	Sub-section 5A				Nanseta
	Section 6			Bvumbwe	
	Section 7			Thomas	
	Section 8			Mphuka	
19	Mulanje				
	Section 1		Mabuka		
	Section 2			Chikumbu	
	Section 3			Mthiramanja	
	Section 4			Mkanda	
	Section 5			Laston Njema	
	Section 6			Juma	
20	Blantyre				
	Section 1			Lundu	
	Section 2			Chigaru	
	Section 3			Kunthembwe	
	Section 4			Makata	
	Section 5		Kapeni		
	Section 6			Kuntaja	
	Section 7			Machinjri	
	Section 8			Somba	
21	Chiradzulu				
	Section 1			Mpama	
	Sub-section 1A				Onga

	District	Paramount Chief	Senior Chief	Chief	Sub-Chief
	Section 2			Nkalo	
	Sub-section 2A				Maoni
	Section 3		Kadewere		
	Sub-section 3A				Mpunga
	Section 4			Nchema	
	Sub-section 4A				Sandareki
	Section 5			Chitera	
	Section 6			Likoswe	
22	Zomba				
	Section 1		Kumtumanji		
	Sub-section 1A				Nkagula
	Section 2			Mwambo	
	Section 3		Chikowi		
	Sub-section 3A				Mbiza
	Sub-section 3B				Ngwelero
	Sub-section 3C				Ntholosa
	Section 4			Mlumbe	
	Section 5			Malemia	
	Section 6			Mkumbira	
23	Machinga				
	Section 1			Liwonde	
	Section 2		Kawinga		
	Sub-section 2A				Nsanama
	Sub-section 2B				Nkoola
	Section 3			Nyambi	
	Section 4			Sitola	
	Section 5			Mlomba	
	Section 6			Chikweo	
	Section 7			Chiwalo	
	Section 8			Ngokwe	
	Section 9			Mposa	
	Section 10			Chamba	
	Section 11			Kapoloma	
24	Phalomba				
	Section 1		Mkumba		
	Sub-section 1A				Janala
	Section 2			Nazambe	
	Sub-section 2A				Nkhulambe
	Section 3			Chiawlo	
	Section 4			Kaduya	
25	Balaka				
	Section 1			Nsamala	
	Sub-section 1A				Nkaya
	Sub-section 1B				Sawali
	Sub-section 1C				Chanthunya
	Section 2			Kalembo	
	Sub-section 2A				Amidu
	Sub-section 2B				Kachenga
26	Mangochi				
	Section 1		Jalasi		
	Section 2			Mponda	
	Section 3			Nankumba	
	Section 4			Katuli	
	Section 5			Makanjira	
	Sub-section 5A				Namavi
	Section 6			Chimwala	
	Section 7			Chowe	
	Section 8			M'bwananyambi	
27	Mwanza				
	Section 1			Kanduku	
	Section 2			Nthache	
	Sub-section 2A				Govati
28	Neno				
	Section 1			Dambe	
	Section 2			Simon Likongwe	
	Section 3			Mlauli	
	Section 4			Ngozi	
	Total	3	26	173	63

Source: Ministry of Local Government and Rural Development, 2008

A6-7 Farmer Satisfaction Survey

The survey was aimed at farmer-evaluation of the rehabilitation works at eight Verification Study sites that were implemented in Aug. – Nov. 2007 and their associated impacts on their irrigated agriculture. In general, the survey looked at the following;

i) Rehabilitation works
   - Level of participation
   - Degree of farmers' satisfaction in the completion of the rehabilitation works

ii) Scheme crop production and returns after rehabilitation works
   - Level of yield and income-satisfaction in the 2008 dry season cropping
   - Level of willingness to participate in the 2009 dry season cropping

iii) New organic farming technology (Windrow Compost, Liquid Manure and Liquid Bocashi Pesticide)
   - Level of participation in the training sessions organized by the Study Team
   - Level of satisfaction of new technologies after trial and field tests
   - Level of willingness to make the manure(s) in the 2009 dry season cropping.

A one to one method of questionnaires was used in the survey at all the 8 Verification sites. In this case Enumerators employed by the Study Team, visited all targeted farmers for the study in their respective schemes. 80% of the total scheme farmers per site were randomly sampled and questionnaires administered.

a) Participation to the Rehabilitation Work

Farmers in all the study sites were committed to the rehabilitation works as shown in **Figure A6-7 (1/10)**. Chiwoza Dam and Titukulane Schemes had registered 100 % participation. These high figures entails that farmers in the schemes were passionate to improve their food security through rehabilitation of various irrigation facilities.

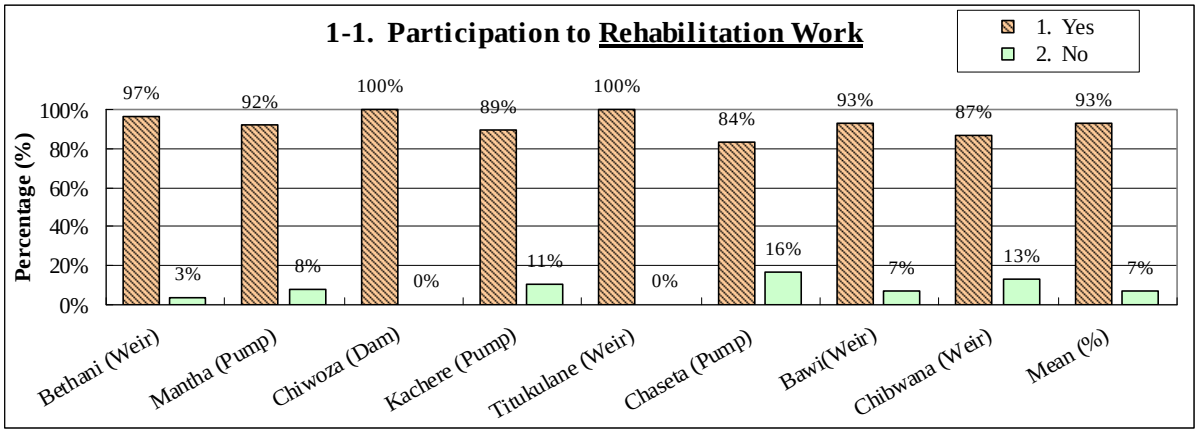


Figure A6-7 (1/10) Level of Participation in the Rehabilitation Work

b) Satisfaction to Rehabilitation Work

Figure A6-7 (2/10) indicates that all farmers from Chiwoza Dam, Bawi and Chibwana Irrigation Schemes were convinced that the rehabilitations were precisely and thoroughly done as agreed before commencement. Likewise the figure also shows that more than 76% of farmers from seven sites except Mantha Scheme also indicated that they were satisfied with the rehabilitation.

On the contrary at Mantha, only 39% of farmers were satisfied with the rehabilitation works. Some of the reasons provided by the farmers for not being satisfied included;

- Main canal length was only partially finished by JICA.
- Overflowing at some portions of the main canal (small canal capacity vs. pump capacity)

Adjustment of the pump speed, provision of additional turn-outs to the main canal and raising of the canal sides to some portions of the main canal were made by JICA Study Team as counter-measures to what was observed to be drawback to irrigation by the canal. Even though these were made it was still observed that farmers' constraint to irrigation was high cost of fuel for the pump.

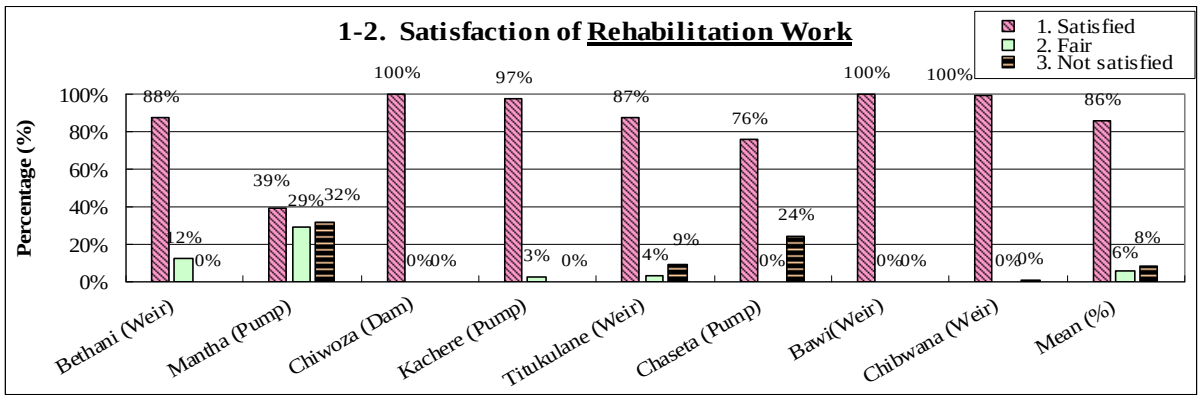


Figure A6-7 (2/10) Level of Satisfaction with the Degree of Completeness

c) Satisfaction of 2008 Dry Season Crop (Production)

Most farmers from the river diversion weir sites (Bethani, Titukulane, Bawi and Chibwana) and water impounding dam site (Chiwoza) indicated that they were more satisfied with the 2008 Dry season cropping than farmers in pump irrigation sites (Mantha, Kachere and Chaseta) as shown in **Figure A6-7 (3/10)**. This is explained by extra costs (fuel for pump operation) which pump sites had to incur beside farm inputs which limited farmers' crop production. Amongst the pump sites, Mantha Scheme registered the least number of farmers satisfaction. This was due to fuel scarcity and difficulties in operating the pump.

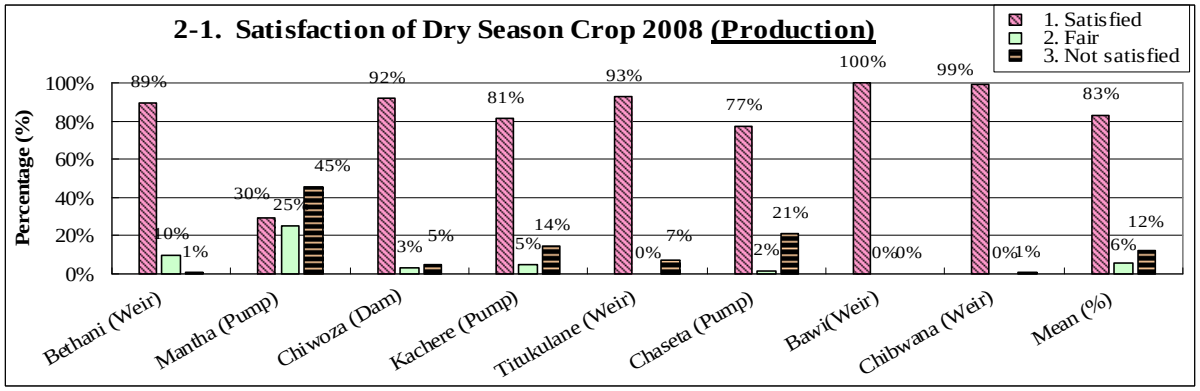


Figure A6-7 (3/10) Level of Satisfaction on 2008 Dry Season Crop Production

d) Increased Farm Income from Dry Season Crop 2008

Figure A6-7 (4/10) below, shows that most farmers from river diversion weir and water impounding dam sites had relatively increased in 2008 dry season income because of irrigation after the rehabilitation works when compared to pump sites. The increment in the income was as a result of improved water conveyance system which allowed crops to have sufficient water.

For the pump sites; Mantha Scheme was limited to fuel costs and other pump related costs. However this was not the case with Chaseta and Kachere Irrigation Schemes whose farmers registered a relatively higher increased income. Despite being a pump site, Chaseta Scheme has residual moisture mostly available through-out the dry season for lower portions of the scheme. On the other hand, improved income from Kachere was as a result of using organic manures, supplement inorganic fertilizers.

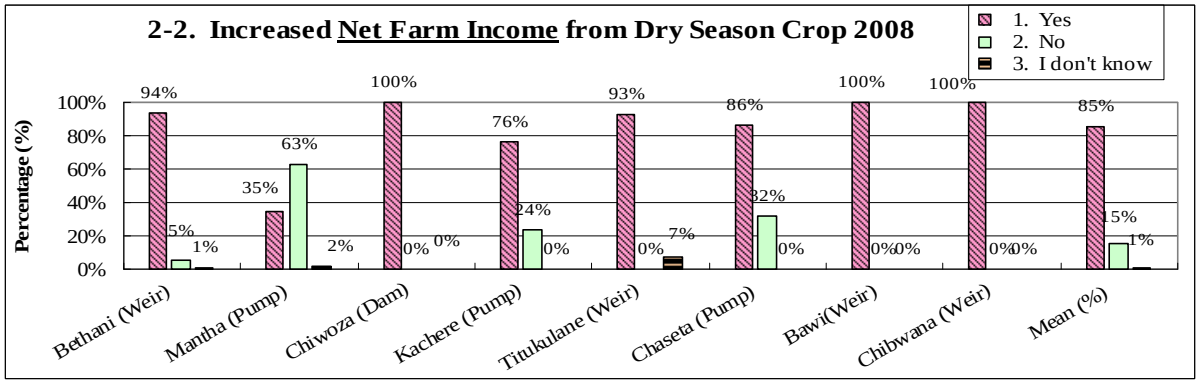


Figure A6-7 (4/10) Level of Satisfaction on Increased Farm Net Income in 2008 Dry Season Crop

e) Participation in the Next Dry Season Cropping

All 8 verification sites are highly indicated that they are willing to participate in the 2009 dry season cropping. **Figure A6-7 (5/10) i**nteresting to note that a lot of farmers in the pump sites, who did not partake in the 2008 dry season cropping expressed desire to participate in the forth coming dry season cropping. Despite poor utilization of the irrigation facilities at Mantha Irrigation Scheme, 95% of the farmers are willing to use the facility in the 2009 dry season cropping. Improvement in the participation in pump sites is emerging from the improved crop production (**Figure A6-7 (3/10)**) and increased farm income (**Figure A6-7 (4/10)**) as well as study tours/visits to other pump irrigation sites which are doing better.

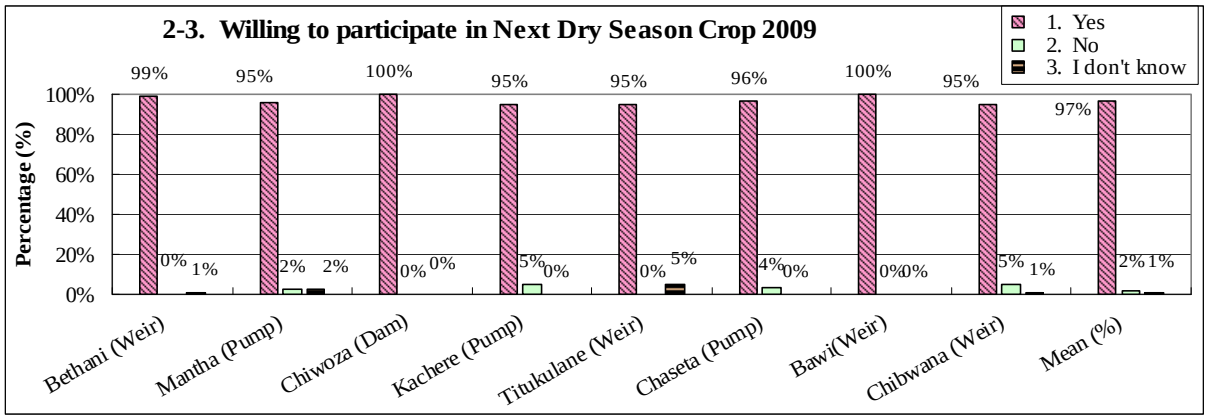


Figure A6-7 (5/10) Level of Willingness to Participate in 2009 Dry Season Cropping

f) Participation in the Compost Training Sessions

Figure A6-7 (6/10) below indicates that in all the verification sites the trainings for Windrow Compost, Liquid Manure and Liquid Bocashi Pesticide were provided. There was high turn up of farmers in Chiwoza Scheme for all the 3 trainings. It was observed that Windrow Compost training was relatively highly attended in all the sites when compared with the other trainings. Chaseta Scheme registered the

highest percentage (54%) of farmers who did not attend either one of the trainings. Amongst the pump sites, Kachere had a good number of farmers who participated in the training sessions. This will be a reason for higher 2008 dry season crop production observed in **Figure A6-7 (3/10).**

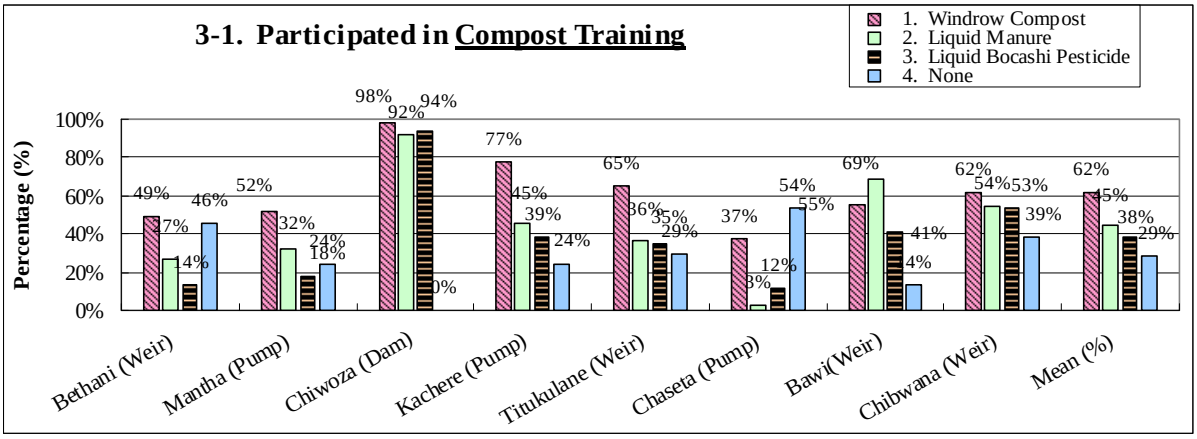


Figure A6-7 (6/10) Level of Participation in Compost Trainings

g) Farmer Satisfaction of Windrow Compost

Of those that participated in the training sessions, the results indicated that more than 64% of farmers were satisfied with the effects of Windrow Compost (**Figure A6-7 (7/10)**). However a few verification sites, e.g. Mantha, Titukulane and Chaseta comprising of 13%, 6% and 13% respectively indicated that they were not satisfied with Windrow Compost. Probable reasons to such response could be that the compost was compared with inorganic fertilizer, which in most cases their effects cannot match in the initial years. However, it is believed that most of the respondents who were satisfied with Windrow Compost when treated as a basal dress fertilizer.

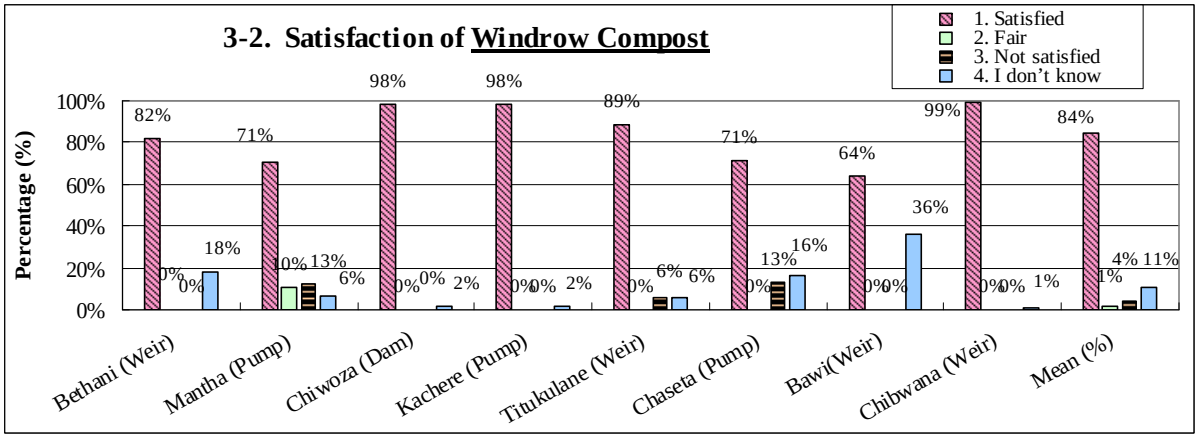


Figure A6-7 (7/10) Level of Satisfaction on Windrow Compost Effectiveness

h) Farmer Satisfaction of Liquid Manure

Most of the farmers from the river diversion weir irrigation schemes and water impounding dam scheme were satisfied with the effects of Liquid Manure after having being tested in the training plots and their individual plots (**Figure A6-7 (8/10)**). Of those who participated in the training, it was also noted 18%, 40% and 70% of the farmers from Mantha, Kachere and Chaseta (pump sites) respectively did not know the effect of Liquid Manure for Mantha, Kachere and Chaseta farmers respectively. During the monitoring period it was noted that very few farmers in these pump sites made and used the manure in their plots hence could not appreciated its effectiveness. Even amongst those that

applied, it had been observed through periodic monitoring that some did not apply recommended rates (1 tea cup/station) at a specified interval (once a week for at least 3 weeks) depending on the type of crop.

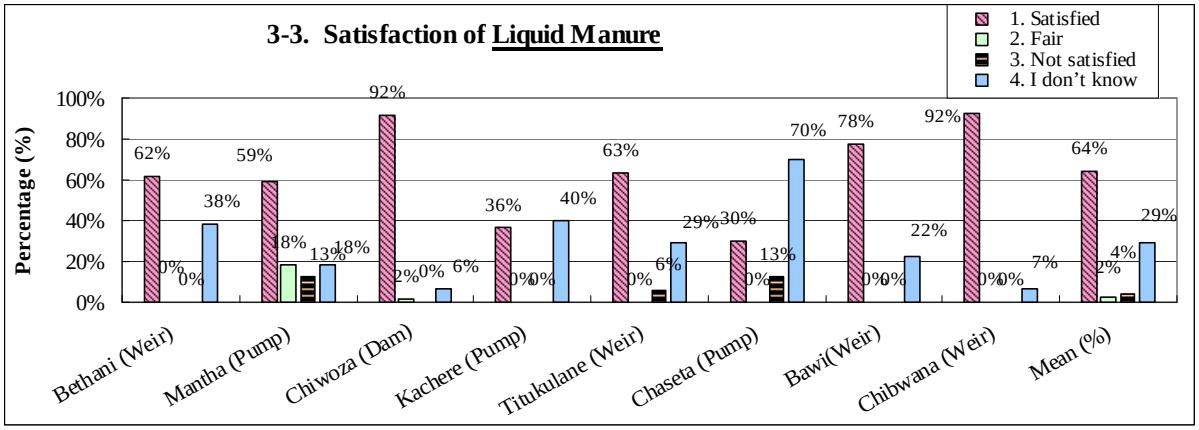


Figure A6-7 (8/10) Level of Satisfaction on Liquid Manure Effectiveness

i) Farmer Satisfaction of Liquid Bocashi Pesticide

Figure A6-7 (9/10) indicated that all diversion weir schemes except Bethani and the water impounding dam site were satisfied with the effectiveness of the Liquid Bocashi Pesticide. During trainings most farmers understood the fact that the pesticide would not be used for all pests in the scheme hence some would need to be treated with artificial pesticides. Type of the substrate (e.g. Tephrosia) for the pesticide extraction and ratio of mixture with the Bocashi determined the strength of the Liquid Bocashi Pesticide hence difference in the level of satisfaction in the figure below. Even though some people were able to note the effectiveness, others did not, for example 62%, 53% and 74% farmers from Bethani, Kachere and Bawi respectively, did not know the effect of the Liquid Bocashi Pesticide.

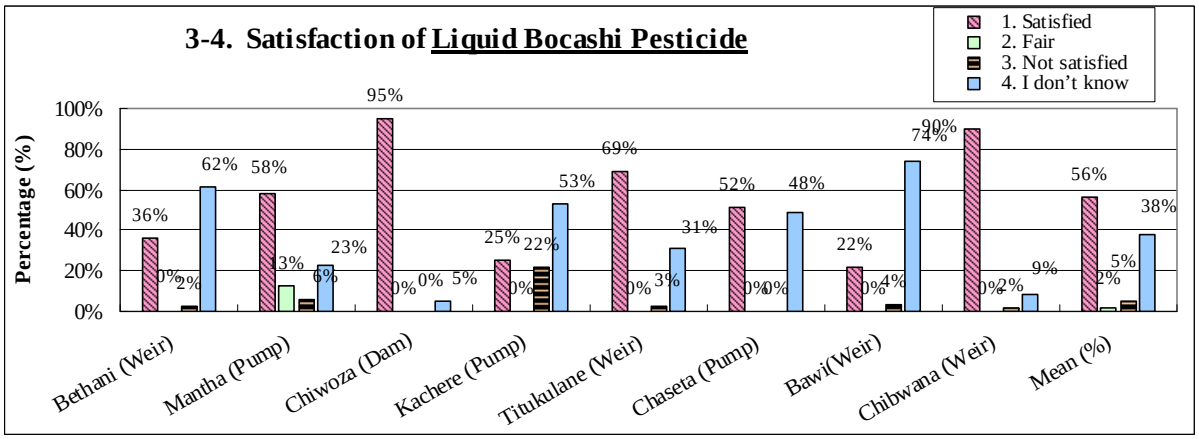


Figure A6-7 (9/10) Level of Satisfaction on Liquid Bocashi Pesticide Effectiveness

j) Willingness to make Compost in the Next Cropping

Amongst the two manures and Lliquid Bocashi Pesticide, a larger percent of farmers are willing to make Windrow Compost than the rest in the next cropping. Almost all farmers in Chiwoza and Bawi sites are willing to make all the manures and the pesticide.

By comparing the level of participation in the training sessions (**Figure A6-7 (6/10)**) and willingness to make in the next cropping (**Figure A6-7 (10/10)**), it is also observed that there is a slightly increased

desire to make Windrow Compost, 62% to 65% (Mean %) and a slightly reduced desire to use Liquid Bocashi Pesticide, 38% to 34% (Mean %). An increased desire to make Windrow Compost is a result of its observed good effects (84%) as shown in **Figure A6-7 (7/10)**. Similarly the reduced desire to make and use Liquid Bocashi Pesticide emanates from the its perceived effectiveness (56%) in **Figure A6-7 (9/10)**.

Availability of raw materials (e.g. tephrosia vogelli) and other recommended alternative plants (blue-gum leaves) for pesticide extraction in Liquid Bocashi Pesticide making in some verification sites could be the reason for not wanting to use the pesticide. However, introduction of such plants in the verification sites would facilitate the adoption rate of the pesticide.

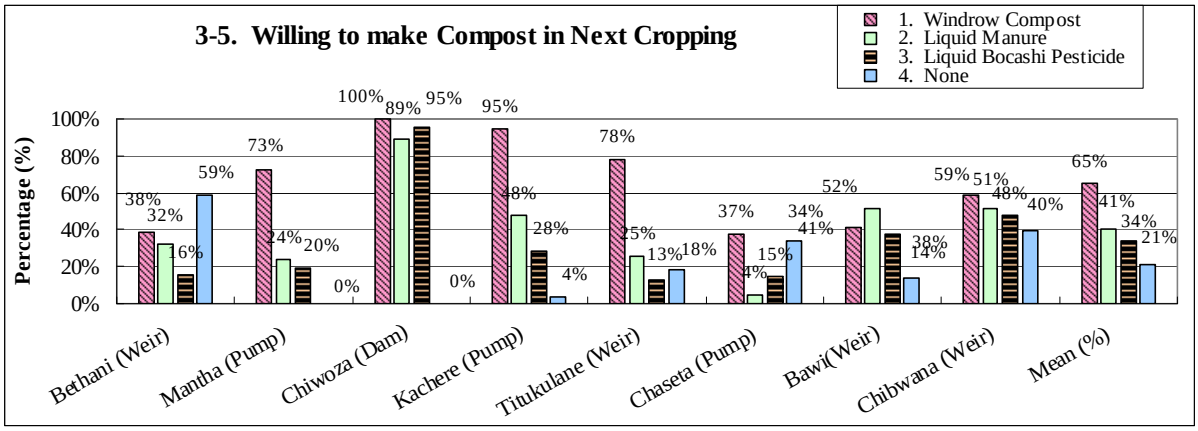


Figure A6-7 (10/10) Level of Willingness to Make Compost in 2009 Dry Season Cropping

Table A6-7 Results of Farmers' Satisfaction Survey at 8 Verification Sites

No.	Questions	Answers	Site	Bethani		Mantha		Chiwoza		Kachere		Titukulane		Chaseta		Bawi		Chibwana		Total	
			Male	60		47		36		46		46		31		16		148		430	
			Female	34		19		26		29		9		36		13		62		228	
			Total	94		66		62		75		55		67		29		210		658	
				Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	Mean (%)
				Weir		Pump		Dam		Pump		Weir		Pump		Weir		Weir			
1-1.	Did you participate in rehabilitation work of irrigation facility?	1. Yes		91	97%	61	92%	62	100%	67	89%	55	100%	56	84%	27	93%	182	87%	**601**	**93%**
		2. No		3	3%	5	8%	0	0%	8	11%	0	0%	11	16%	2	7%	28	13%	**57**	**7%**
1-2.	Are you satisfied with the degree of completeness of rehabilitation work? (If not satisfied, please write the reason below.)	1. Satisfied		80	88%	26	39%	62	100%	73	97%	48	87%	51	76%	29	100%	207	100%	**576**	**86%**
		2. Fair		11	12%	19	29%	0	0%	2	3%	2	4%	0	0%	0	0%	0	0%	**34**	**6%**
		3. Not satisfied		0	0%	21	32%	0	0%	0	0%	5	9%	16	24%	0	0%	1	0%	**43**	**8%**
2	Did you participate in dry season cropping in the scheme in 2008? (If answer is Yes, please proceed to questions 2-2 and 2-3.)	1. Yes		93	99%	44	68%	60	100%	21	28%	43	78%	57	85%	28	100%	124	60%	**470**	**77%**
		2. No		1	1%	21	32%	0	0%	54	72%	12	22%	10	15%	0	0%	84	40%	**182**	**23%**
2-1.	Are you satisfied with the yield of dry season cropping comparing with after-rehabilitation and before-rehabilitation?	1. Satisfied		83	89%	13	30%	55	92%	17	81%	40	93%	44	77%	29	100%	123	99%	**404**	**83%**
		2. Fair		9	10%	11	25%	2	3%	1	5%	0	0%	1	2%	0	0%	0	0%	**24**	**6%**
		3. Not satisfied		1	1%	20	45%	3	5%	3	14%	3	7%	12	21%	0	0%	1	1%	**43**	**12%**
2-2.	Do you think your income from dry season cropping has been increased because of irrigation after rehabilitation?	1. Yes		87	94%	16	35%	60	100%	16	76%	40	93%	49	73%	26	100%	124	100%	**418**	**84%**
		2. No		5	5%	29	63%	0	0%	5	24%	0	0%	18	27%	0	0%	0	0%	**57**	**15%**
		3. I don't know		1	1%	1	2%	0	0%	0	0%	3	7%	0	0%	0	0%	0	0%	**5**	**1%**
2-3.	Do you want to participate in next dry season copping using irrigation facility? (If No or Don't know, please write the reasons	1. Yes		92	99%	42	95%	60	100%	20	95%	41	95%	55	96%	29	100%	123	95%	**462**	**97%**
		2. No		0	0%	1	2%	0	0%	1	5%	0	0%	2	4%	0	0%	6	5%	**10**	**2%**
		3. I don't know		1	1%	1	2%	0	0%	0	0%	2	5%	0	0%	0	0%	1	1%	**5**	**1%**
3-1.	Did you participate in the training session of Windrow Compost, Liquid Manure, Liquid Bocashi Pesticide? (Please circle what you participated.)	1. Windrow Compost		46	49%	34	52%	61	98%	58	77%	36	65%	25	37%	16	55%	130	62%	**406**	**62%**
		2. Liquid Manure		25	27%	21	32%	57	92%	34	45%	20	36%	2	3%	20	69%	114	54%	**293**	**45%**
		3. Liquid Bocashi		13	14%	12	18%	58	94%	29	39%	19	35%	8	12%	12	41%	112	53%	**263**	**38%**
		4. None		43	46%	16	24%	0	0%	18	24%	16	29%	36	54%	4	14%	81	39%	**214**	**29%**
3-2.	If you participated, are you satisfied with the effect of Windrow Compost?	1. Satisfied		41	82%	34	71%	61	98%	56	98%	31	89%	22	71%	18	64%	127	99%	**390**	**84%**
		2. Fair		0	0%	5	10%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	**5**	**1%**
		3. Not satisfied		0	0%	6	13%	0	0%	0	0%	2	6%	4	13%	0	0%	0	0%	**12**	**4%**
		4. I don't know		9	18%	3	6%	1	2%	1	2%	2	6%	5	16%	10	36%	1	1%	**32**	**11%**
3-3.	If you participated, are you satisfied with the effect of Liquid Manure?	1. Satisfied		29	62%	29	59%	57	92%	20	36%	24	63%	9	30%	21	78%	118	92%	**307**	**64%**
		2. Fair		0	0%	9	18%	1	2%	0	0%	0	0%	0	0%	0	0%	0	0%	**10**	**2%**
		3. Not satisfied		0	0%	2	4%	0	0%	13	24%	3	8%	0	0%	0	0%	1	1%	**19**	**5%**
		4. I don't know		18	38%	9	18%	4	6%	22	40%	11	29%	21	70%	6	22%	9	7%	**100**	**29%**
3-4.	If you participated, are you satisfied with the effect of Liquid Bocashi Pesticide?	1. Satisfied		17	36%	28	58%	59	95%	13	25%	24	69%	16	52%	6	22%	114	90%	**277**	**56%**
		2. Fair		0	0%	6	13%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	**6**	**2%**
		3. Not satisfied		1	2%	3	6%	0	0%	11	22%	1	3%	0	0%	1	4%	2	2%	**19**	**5%**
		4. I don't know		29	62%	11	23%	3	5%	27	53%	11	31%	15	48%	20	74%	11	9%	**127**	**38%**
3-5.	Which organic fertilizer do you want to make in next cropping? (Please circle all items applied)	1. Windrow Compost		36	38%	48	73%	62	100%	71	95%	43	78%	25	37%	12	41%	124	59%	**421**	**65%**
		2. Liquid Manure		30	32%	16	24%	55	89%	36	48%	14	25%	3	4%	15	52%	108	51%	**277**	**41%**
		3. Liquid Bocashi Pesti		15	16%	13	20%	59	95%	21	28%	7	13%	10	15%	11	38%	100	48%	**236**	**34%**
		4. None		55	59%	0	0%	0	0%	3	4%	10	18%	23	34%	4	14%	83	40%	**178**	**21%**

APPENDIX 7

COST ESTIMATES

APPENDIX 7 COST ESTIMATES

Contents

Table A7-1 Project Costs Disbursement Schedule for A/P and D/P

(Unit: MK '000)

	Year	A/P								D/P								Overall							
		1) River Diversion		2) Water Impounding		3)Motorized Pump		Total		1) River Diversion		2) Water Impounding		3)Motorized Pump		Total		1) River Diversion		2) Water Impounding		3)Motorized Pump		**Total**	
		Site	Amount	Site	Amount	Site	Amount	Site	Amount	Site	Amount	Site	Amount	Site	Amount	Site	Amount	Site	Amount	Site	Amount	Site	Amount	**Site**	**Amount**
		(No)	(MK '000)	(No)	(MK '000)	(No)	(MK '000)	(No)	(MK '000)	(No)	(MK '000)	(No)	(MK '000)	(No)	(MK '000)	(No)	(MK '000)	(No)	(MK '000)	(No)	(MK '000)	(No)	(MK '000)	**(No)**	(MK '000)
	(Cost per site)		3,192.0		4,110.0		3,037.2				4,785.6		14,159.6		4,498.8										
1	2010/11	25	79,800.0	2	8,220.0	0	0.0	27	88,020.0	0	0.0	0	0.0	0	0.0	0	0.0	25	79,800.0	2	8,220.0	0	0.0	**27**	**88,020.0**
2	2011/12	5	15,960.0	3	12,330.0	0	0.0	8	28,290.0	30	143,568.0	4	56,638.4	0	0.0	34	200,206.4	35	159,528.0	7	68,968.4	0	0.0	**42**	**228,496.4**
3	2012/13	0	0.0	0	0.0	15	45,558.0	15	45,558.0	40	191,424.0	7	99,117.2	0	0.0	47	290,541.2	40	191,424.0	7	99,117.2	15	45,558.0	**62**	**336,099.2**
4	2013/14	0	0.0	0	0.0	15	45,558.0	15	45,558.0	35	167,496.0	7	99,117.2	10	44,988.0	52	311,601.2	35	167,496.0	7	99,117.2	25	90,546.0	**67**	**357,159.2**
5	2014/15	0	0.0	0	0.0	5	15,186.0	5	15,186.0	40	191,424.0	7	99,117.2	15	67,482.0	62	358,023.2	40	191,424.0	7	99,117.2	20	82,668.0	**67**	**373,209.2**
6	2015/16	0	0.0	0	0.0	0	0.0	0	0.0	6	28,713.6	12	169,915.2	37	166,455.6	55	365,084.4	6	28,713.6	12	169,915.2	37	166,455.6	**55**	**365,084.4**
	Total in MK	30	95,760.0	5	20,550.0	35	106,302.0	70	222,612.0	151	722,625.6	37	523,905.2	62	278,925.6	250	1,525,456.4	181	818,385.6	42	544,455.2	97	385,227.6	320	1,748,068.4
	(in US$ '000)		(684)		(147)		(759)		(1,590)		(5,162)		(3,742)		(1,992)		(10,896)		(5,846)		(3,889)		(2,752)		(12,486)

(Unit: MK)

Table A7-2 Rehabilitaion Costs per Scheme and Cost Sharing for A/P

No.	Categories	Parties	River Diversion Weir	Water Impounding Dam	Motorized Pump	remarks
1	Tools	Donor	212,951	217,149	208,522	
		GOM	0	0	0	
		Farmer Group	0	0	0	
		Total	212,951	217,149	208,522	
2	Material	Donor	1,693,000	2,126,673	1,152,632	
		GOM	0	0	0	
		Farmer Group	45,479	48,935	83,466	
		Total	1,738,479	2,175,608	1,236,098	
3	Pump, Parts	Donor	0	0	480,000	
		Repair GOM	0	0	0	
		Total	0	0	480,000	
4	Transportation	Donor	0	0	0	
		GOM	112,000	119,000	0	
		Farmer Group	21,000	22,500	55,500	
		Fuel (Donor)	112,800	119,850	0	
		Total	245,800	261,350	55,500	
5	Labor	Farmer Group	321,800	411,000	309,400	
6	Supervision	GOM.	140,715	177,885	241,605	
	Total (MK)	Donor	2,019,000	2,464,000	1,841,000	rounded
		GOM	253,000	297,000	242,000	rounded
		Farmer Group	388,000	482,000	448,000	rounded
		Total	**2,660,000**	**3,243,000**	**2,531,000**	
	Cost Sharing (%)	Donor	75.9%	76.0%	72.7%	
		GOM	9.5%	9.2%	9.6%	
		Farmer Group	14.6%	14.9%	17.7%	

(Unit: MK)

Table A7-3 Construction Cost per Scheme and Cost Sharing for D/P

No.	Categories	Parties	River Diversion Weir	Water Impounding Dam	Motorized Pump	remarks
1	Tools	Donor	222,209	222,209	214,617	
		GOM	0	0	0	
		Farmer Group	0	0	0	
		Total	222,209	222,209	214,617	
2	Material	Donor	2,510,111	1,025,266	1,785,273	
		GOM	0	0	0	
		Farmer Group	57,905	19,904	147,089	
		Total	2,568,016	1,045,170	1,932,362	
3	Pump, Parts	Donor	0	0	480,000	
		Repair GOM	0	0	0	
		Total	0	0	480,000	
4	Transportation	Donor	0	0	0	
		GOM	203,000	63,000	98,000	
		Farmer Group	12,000	9,000	49,500	
		Fuel (Donor)	204,450	63,450	98,700	
		Total	419,450	135,450	246,200	
5	Labor	Farmer Group	518,200	252,800	482,600	
6	Supervision	GOM.	260,190	130,095	392,940	
7	Others					
	Construction of embankment					
		GOM		831,090		
		Fuel(Donor)		10,998,000		
	Total (MK)	Donor	2,937,000	12,309,000	2,579,000	rounded
		GOM	463,000	1,024,000	491,000	rounded
		Farmer Group	588,000	282,000	679,000	rounded
		Total	**3,988,000**	**13,615,000**	**3,749,000**	
	Cost Sharing (%)	Donor	73.6%	90.4%	68.8%	
		GOM	11.6%	7.5%	13.1%	
		Farmer Group	14.7%	2.1%	18.1%	

Table A7-4 Unit Price for A/P and D/P

No.	DESCRIPTION		UNIT	Currency	Unit Price			remarks
				MK	2007		2008	
	TOOLS						2007*1.15	
1	Bycycle	ordinary	set		8,850.00		10,178	
2	Wheel barrow	ordinary	set		7,500.00		8,625	
3	Trowel	for mortar work	1pc.		465.00		535	
4	Line level		1pc.		500.00		575	
5	Shovel	ordinary	1pc.		950.00		1,093	
6	Hand saw	for wood	1pc.		1,100.00		1,265	
7	Hand saw	for steel	1pc.		1,525.00		1,754	
8	Bucket	plastic 20 litter	1pc.		450.00		518	
9	Bucket Galvanized steel 20 lit		1pc.		575.00		661	
10	Hammer	medium	1pc.		995.00		1,144	
11	Hammer	4 lbs	1pc.		695.00		799	
12	Hammer	14 lbs	1pc.		1,650.00		1,898	
13	Calculator		1unit		950.00		1,093	
14	Plier		1pc.		550.00		633	
15	Pickax		1pc.		875.00		1,006	
16	Measuring tape	50m	1unit		2,650.00		3,048	
17	chisel		1pc.		850.00		978	
18	Brick Bolster		1pc.		1,150.00		1,323	
19	Level		1pc.		495.00		569	
20	Drum		1pc.		2,300.00		2,645	
21	Water level gauge		1set				0	
	MATERIALS							
31	Cement		1bag		2,500.00		2,875	
32	Gabion wirenet	2m x 1m x 1m	1pc.		10,741.00		12,352	
32-2	Gabion wirenet	4m x 1m x 1m	1pc.		19,409.84		22,321	
33	Plywood	1200 x 2400 x 12	1pc.		2,250.00		2,588	
38	Timber	50 x 50 mm	5.5m		280.00		322	
61	Timber	150 x 25 mm	5.5m		370.00		426	
39	nail	100mm	kg		175.00		201	
40	nail	75mm	kg		175.00		201	
41	nail	50mm	kg		175.00		201	
42-1	PVC	ϕ75	1pc.		1,742.00		2,003	
42	PVC	ϕ90	1pc.		2,131.00		2,451	
43	PVC	ϕ110	1pc.		3,534.00		4,064	
44	PVC	ϕ140	1pc.		4,219.00		4,852	
51	PVC	ϕ160	1pc.		5,352.00		6,155	
45	PVC	ϕ200	1pc.		8,811.00		10,133	
46	Steel plate	1200 x 2400 x 6	1pc.		29,056.00		33,414	
47	Steel wire	2.5mm	5kg		1,250.00		1,438	
48	Diesel		lit		210.00		242	
49	Engine oil	diesel	lit		650.00		748	
100	Pump with engine	10hp	1set		239,125.00		274,994	Liester
101	Pump with engine	20hp	1set		425,000.00		488,750	Liester
50	Grease		lit		720.00		828	
71	Note book				225.00		259	
72	Ball point pen				13.50		16	
73	Measuring tape	3m			150.00		173	
74	Marker				39.50		45	
75	Calculater				950.00		1,093	

Table A7-5 (1) Quantity of Rehabilitation Work under A/P (River Diversion Weir)

No.	Item	Specification/Quality	Quantity	Unit		Remarks
	Rehabilitation of stone masonry weir		60.0	m^3	Vw	
	Construction of stone masonry intake		12.0	m^3	Vi	H=1.5mx2
	River bed protection	gabion	24.0	pcs	Rp	2.0mx1.0mx1.0m
	Rehabilitation of canal	brick	300.0	m	Lc	B=0.36m
	Gully crossing		4.0	set	Ng	
1	Preparation Work					
	Site clearing	unskilled labor	30.0	m･d		2day
	Gathering stones	unskilled labor	96.2	man		St/10x7.8
	Gathering sand	unskilled labor	31.9	man		Sa/10x7.8
2	Stone Masonry Weir		60.0	m^3	Vw	
	rubble stone		64.8	m^3		Vw x 1.08
	sand		26.4	m^3		Vw x 0.5 x 1.1 x 0.8
	cement	ordinary portland	297.0	bag		Vw x 0.5 x 1.1 x 9
	excavation	unskilled labor	156.0	man		20m^3
	mortar mixing	unskilled labor	198.0	man		Vw x 0.5 x 1.1 x 6
	stone masonry	foreman	18.0	man		0.3 x Vw
		skilled labor	36.0	man		0.6 x Vw
		unskilled labor	216.0	man		3.6 x Vw
3	Intake		12.0	m^3	Vi	
	rubble stone		13.0	m^3		Vi x 1.08
	sand		5.3	m^3		Vi x 0.5 x 1.1 x 0.8
	cement	ordinary portland	59.4	bag		Vi x 0.5 x 1.1 x 9
	PVC	ϕ=160	1.0	pc		6m
	excavation	unskilled labor	3.1	man		4m^3
	mortar mixing	unskilled labor	39.6	man		6 x 0.5 x 1.1 x Vi
	stone masonry	foreman	3.6	man		0.3 x Vi
		skilled labor	7.2	man		0.6 x Vi
		unskilled labor	43.2	man		3.6 x Vi
4	Gabion Work					
	gabion	2.0 x 1.0 x 1.0	24.0	pcs	Rp	
	rubble stone		45.6	m^3		2.0x0.95xRp
	steel wire		12.0	kg		0.5kg/pc
	gabion work	foreman	3.1	man		0.13xRp
		skilled labor	6.0	man		0.25xRp
		unskilled labor	84.0	man		3.5xRp
5	Gully Crossing	Box 600 x 600 x 475	8.0	pcs		Ngx2
	bricks		1,784.0	pcs		223.0xNgx2
	sand		1.1	m^3		0.16x0.8xNgx2x1.1
	cement		12.7	bag		0.16xNgx2x9x1.1
	PVC pipe	ϕ200	4.0	pc		6m/Ng

No.	Item	Specification/Quality	Quantity	Unit		Remarks
	excavation	unskilled labor	2.6	man		0.33xNgx2
	mortar mixing	unskilled labor	16.0	man		2.0xNgx2
	brick laying	foreman	2.6	man		0.33xNgx2
		skilled labor	2.6	man		0.33xNgx2
		unskilled labor	5.4	man		0.67xNgx2
6	Main Canal Rectangular	W=0.36 D=0.38	300.0	m	Lc	
	bricks		18,255.0	pcs		730.2xLc/12
	sand		8.1	m^3		0.37xLc/12x0.8x1.1
	cement	ordinary portland	91.6	bag		0.37xLc/12x9x1.1
	material total					
	excavation	unskilled labor	9.2	man		Lcx0.24/7.8
	mortar mixing	unskilled labor	100.0	man		4xLc/12
	brick laying	skilled labor	25.0	man		1xLc/12
		unskilled labor	225.0	man		9*Lc/12
		foreman	25.0	man		1.0/12xLc
7	Transportation	Tractor trailer	16.0	day	stones	St/4/2trips
	loading and unloading	unskilled labor	128.0	man		8men/day
		Oxcart	14.0	day	bricks	1500pcs/day
	loading and unloading	unskilled labor	70.0	man		5man/day
8	Fuel	diesel	480.0	lit		30lit/day
9	Others					
	Total Material					
	rubble stone		123.4	m^3	St	
	sand		40.9	m^3	Sa	
	cement	ordinary portland	461.0	bag		
	bricks		20,039.0	pcs		
	gabion		24.0	pcs		
	steel wire		12.0	kg		
	PVC pipe	φ160 class6	1.0	pcs		
	PVC pipe	φ200 class6	4.0	pcs		
	fuel	diesel	480.0	lit		
	Total Labor					
	foreman		53.0	man		AEDO
	skilled labor		77.0	man		if employed
	unskilled labor		1,455.0	man		Farmers

Table A7-5 (2) Quantity of Rehabilitation Work under A/P (Water Impounding Dam)

No.	Item	Specification/Quality	Quantity	Unit		Remarks
	Rehabilitation of stone masonry		120.0	m^3	Vs	spillway, etc.
	Rehabilitation of embankment		150.0	m^3	Ve	
	De-silting	excavation	150.0	m^3	Vd	
	Rehabilitation of canal	brick	300.0	m	Lc	B=0.36m
	Gully crossing		8.0	set	Ng	
1	Preparation Work					
	Site clearing	unskilled labor	30.0	m･d		1day
	Gathering stones	unskilled labor	101.1	man		St/10x7.8
	Gathering sand	unskilled labor	49.3	man		Sa/10x7.8
2	Stone Masonry		120.0	m^3		Vs
	rubble stone		129.6	m^3		Vs x 1.08
	sand		52.8	m^3		Vs x 0.5 x 1.1 x 0.8
	cement	ordinary portland	594.0	bag		Vs x 0.5 x 1.1 x 9
	excavation	unskilled labor	15.6	man		7.8/10m^3
	mortar mixing	unskilled labor	396.0	man		Vs x 0.5 x 1.1 x 6
	stone masonry	foreman	36.0	man		0.3 x Vs
		skilled labor	72.0	man		0.6 x Vs
		unskilled labor	432.0	man		3.6 x Vs
3	Rehabilitation of embankment		150.0	m^3	Ve	excavated material
	embankment	unskilled labor	114.0	man		Ve/10*7.6
4	De-silting		150.0	m^3	Vd	
	excavation	unskilled labor	117.0	man		Vd/10*7.8
5	Rehabilitation of canal	W=0.36 D=0.38	300.0	m	Lc	
	bricks		18,255.0	pcs		730.2xLc/12
	sand		8.1	m^3		0.37xLc/12x0.8x1.1
	cement	ordinary portland	91.6	bag		0.37xLc/12x9x1.1
	excavation	unskilled labor	9.2	man		Lc*0.24/7.8
	mortar mixing	unskilled labor	100.0	man		4xLc/12
	brick laying	skilled labor	25.0	man		1xLc/12
		unskilled labor	225.0	man		9xLc/12
		foreman	25.0	man		1.0/12xLc
6	Gully Crossing	Box 600 x 600 x 475	16.0	pcs		Ngx2
	bricks		3,568.0	pcs		223.0xNgx2
	sand		2.3	m^3		0.16x0.8xNgx2x1.1
	cement		23.0	bag		0.16xNgx2x9x1.1
	PVC pipe	ϕ200	8.0	pc		6m/Ng

No.	Item	Specification/Quality	Quantity	Unit		Remarks
	excavation	unskilled labor	5.3	man		0.33xNgx2
	mortar mixing	unskilled labor	32.0	man		2.0xNgx2
	brick laying	foreman	5.3	man		0.33xNgx2
		skilled labor	5.3	man		0.33xNgx2
		unskilled labor	10.7	man		0.67xNgx2
7	Transportation	Tractor trailer	17.0	day	stones	St/4/2trips
	loading and unloading	unskilled labor	136.0	man	stones	8men/day
		Oxcart	15.0	day	bricks	1500pcs/day
	loading and unloading	unskilled labor	75.0	man	bricks	5man/day
8	Fuel	diesel	510.0	lit		30lit/day
	Total Material					
	rubble stone		129.6	m^3	St	
	sand		63.2	m^3	Sa	
	cement	ordinary portland	709.0	bag		
	bricks		21,823.0	pcs		
	PVC pipe	ϕ200 class6	8.0	pcs		
	fuel	diesel	510.0	lit		
	Total Labor					
	foreman		67.0	man		AEDO
	skilled labor		103.0	man		if employed
	unskilled labor		1849.0	man		Farmers

Table A7-5 (3) Quantity of Rehabilitation Work under A/P (Motorized Pump)

No.	Item	Specification/Quality	Quantity	Unit		Remarks
	Construction of main canal		800.0	m	Lc	
	Discharge box	1000x1000x855	8.0	pc	Nd	
	Gully crossing		6.0	set	Ng	
	Installation of pipes	ϕ 90	600.0	m	Lp	
	Motorized pump	10HP	1.0	set	Np	
1	Preparation Work					
	Site clearing	unskilled labor	15.0	m･d		1day
	Gathering sand	unskilled labor	20.2	man		Sa/10x7.8
2	Main Canal Rectangular	W=0.36 D=0.38	800.0	m	Lc	brick
	bricks		48,680.0	pcs		730.2/12xLc
	sand		21.7	m^3		0.37/12x0.8xLcx1.1
	cement	ordinary portland	244.2	bag		0.37/12x9xLcx1.1
	excavation	unskilled labor	15.4	man		Lc*0.24/7.8
	mortar mixing	unskilled labor	266.7	man		4xLc/12
	brick laying	skilled labor	66.7	man		1xLc/12
		unskilled labor	600.0	man		9*Lc/12
		foreman	66.7	man		1.0/12xLc
3	Discharge box	1000x1000x855	8.0		Nd	
	bricks		4,288.0	pcs		536xNd
	sand		2.5	m^3		0.36x0.8xNdx1.1
	cement	ordinary portland	28.5	bag		0.36x9xNdx1.1
	excavation	unskilled labor	8.0	man		1.0xNd
	mortar mixing	unskilled labor	32.0	man		4.0xNd
	brick laying	skilled labor	8.0	man		1.0xNd
		unskilled labor	32.0	man		4.0xNd
		foreman	8.0	man		1.0xNd
4	Gully Crossing	Box 600 x 600 x 475	12.0	pcs	Ngx2	
	bricks		2,676.0	pcs		223.0x2xNg
	sand		1.7	m^3		0.16x0.8x2xNgx1.1
	cement		19.0	bag		0.16x9x2xNgx1.1
	PVC pipe	ϕ 200	6.0	pc		6m
	excavation	unskilled labor	4.0	man		0.33x2xNg
	mortar mixing	unskilled labor	24.0	man		2.0x2xNg
	brick laying	foreman	4.0	man		0.33x2xNg
		skilled labor	4.0	man		0.33x2xNg
		unskilled labor	8.0	man		0.67x2xNg

No.	Item	Specification/Quality	Quantity	Unit		Remarks
5	Pipe Installation	φ90	600.0	m	Lp	
	excavation	unskilled labor	84.2	man		0.18/10x7.8xLp
	backfill	unskilled labor	49.7	man		0.18/10x4.6xLp
	pipe installation	unskilled labor	45.0	man		7.5man/100m
		foreman	12.0	man		1.0/50xLp
	PVC pipe	φ90	100.0	本		Lc/6
6	Motorized pump	10HP	1.0	set		
7	Transportation	oxcart	37.0	day	bricks	1500pcs/day
	loading and unloading	unskilled labor	185.0	man		5man/day
8	Others					
	Total Material					
	sand		25.9	m^3	Sa	
	cement	ordinary portland	292.0	bag		
	bricks		55,644.0	pcs		
	PVC pipe	φ90 class6	100.0	pcs		
	PVC pipe	φ200 class6	6.0	pcs		
	fuel	diesel	0.0	lit		
	Total Labor					
	foreman		91.0	man		AEDO
	skilled labor		79.0	man		if employed
	unskilled labor		1389.0	man		Farmers

Table A7-6 (1) Quantity of Rehabilitation Work under D/P (River Diversion Weir)

No.	Item	Specification/Quality	Quantity	Unit		Remarks
	Construction of stone masonry weir		90.0	m^3	Vw	H=2.0m, L=20.0m
	Construction of stone masonry intake		12.0	m^3	Vi	H=1.5mx2
	River bed protection	gabion	48.0	pcs	Rp	2.0mx1.0mx1.0m
	Construction of canal	brick	300.0	m	Lc	B=0.36m
	Construction of canal	earth	3,000.0	m	Le	B=0.3m
	Gully crossing		8.0	set	Ng	
1	Preparation Work					
	Site clearing	unskilled labor	15.0	m･d		1day
	Gathering stones	unskilled labor	157.1	man		St/10x7.8
	Gathering sand	unskilled labor	43.1	man		Sa/10x7.8
2	Stone Masonry Weir		90.0	m^3	Vw	
	rubble stone		97.2	m^3		Vw x 1.08
	sand		39.6	m^3		Vw x 0.5 x 1.1 x 0.8
	cement	ordinary portland	445.5	bag		Vw x 0.5 x 1.1 x 9
	excavation	unskilled labor	7.8	man		10m^3
	mortar mixing	unskilled labor	297.0	man		Vw x 0.5 x 1.1 x 6
	stone masonry	foreman	27.0	man		0.3 x Vw
		skilled labor	54.0	man		0.6 x Vw
		unskilled labor	324.0	man		3.6 x Vw
3	Intake		12.0	m^3	Vi	
	rubble stone		13.0	m^3		Vi x 1.08
	sand		5.3	m^3		Vi x 0.5 x 1.1 x 0.8
	cement	ordinary portland	59.4	bag		Vi x 0.5 x 1.1 x 9
	PVC	ϕ=160	1.0	pc		6m
	excavation	unskilled labor	1.6	man		2m^3
	mortar mixing	unskilled labor	39.6	man		6 x 0.5 x 1.1 x Vi
	stone masonry	foreman	3.6	man		0.3 x Vi
		skilled labor	7.2	man		0.6 x Vi
		unskilled labor	43.2	man		3.6 x Vi
4	Gabion Work					
	gabion	2.0 x 1.0 x 1.0	48.0	pcs	Rp	
	rubble stone		91.2	m^3		2.0x0.95xRp
	steel wire		24.0	kg		0.5kg/pc
	gabion work	foreman	6.2	man		0.13xRp
		skilled labor	12.0	man		0.25xRp
		unskilled labor	168.0	man		3.5xRp
5	Gully Crossing	Box 600 x 600 x 475	16.0	pcs		Ngx2
	bricks		3,568.0	pcs		223.0xNgx2
	sand		2.3	m^3		0.16x0.8xNgx2x1.1
	cement		25.3	bag		0.16xNgx2x9x1.1
	PVC pipe	ϕ200	8.0	pc		6m/Ng

No.	Item	Specification/Quality	Quantity	Unit		Remarks
	excavation	unskilled labor	5.3	man		0.33xNgx2
	mortar mixing	unskilled labor	32.0	man		2.0xNgx2
	brick laying	foreman	5.3	man		0.33xNgx2
		skilled labor	5.3	man		0.33xNgx2
		unskilled labor	10.7	man		0.67xNgx2
6	Main Canal Rectangular	B=0.36 D=0.38	300.0	m	Lc	
	bricks		18,255.0	pcs		730.2xLc/12
	sand		8.1	m^3		0.37xLc/12x0.8x1.1
	cement	ordinary portland	91.6	bag		0.37xLc/12x9x1.1
	material total					
	excavation	unskilled labor	9.2	man		Lcx0.24/7.8
	mortar mixing	unskilled labor	100.0	man		4xLc/12
	brick laying	skilled labor	25.0	man		1xLc/12
		unskilled labor	225.0	man		9*Lc/12
		foreman	25.0	man		1.0/12xLc
7	Main Canal Trapezoid	B=0.3m D=0.3m	3,000.0	m		excavation
	excavation	unskilled labor	631.8	man		Lex0.27/10x7.8
		foreman	30.0	man		Le/100
8	Transportation	Tractor trailer	26.0	day	stones	St/4/2trips
	loading and unloading	unskilled labor	208.0	man		8men/day
	Transportation brick	Tractor trailer	3.0	day	50.0%	3600pcs/day
	loading and unloading	unskilled labor	24.0	man		8man/day
		Oxcart	8.0	day	50.0%	1500pcs/day
	loading and unloading	unskilled labor	40.0	man		5man/day
9	Fuel	diesel	870.0	lit		30lit/day
	Total Material					
	rubble stone		201.4	m^3	St	
	sand		55.3	m^3	Sa	
	cement	ordinary portland	622.0	bag		
	bricks		21,823.0	pcs		
	gabion		48.0	pcs		
	steel wire		24.0	kg		
	PVC pipe	ϕ160 class6	1.0	pcs		
	PVC pipe	ϕ200 class6	8.0	pcs		
	fuel	diesel	870.0	lit		
	Total Labor					
	foreman		98.0	man		AEDO
	skilled labor		104.0	man		if employed
	unskilled labor		2,383.0	man		Farmers

Table A7-6 (2) Quantity of Rehabilitation Work under D/P (Water Impounding Dam)

No.	Item	Specification/Quality	Quantity	Unit		Remarks
	Construction of stone masonry		60.0	m^3	Vs	
	Rehabilitation of embankment		0.0	m^3	Ve	
	De-silting	excavation	0.0	m^3	Vd	
	Construction of canal	brick	100.0	m	Lc	B=0.36m
	Construction of canal	earth	2,000.0	m	Le	B=0.3m
	Gully crossing		4.0	set	Ng	
	Construction of intake		1.0	set	Ni	
	Construction of embankment		15,600.0	m^3	V	H=6.0m L=200m
1	Preparation Work					
	Site clearing	unskilled labor	15.0	m･d		1day
	Gathering stones	unskilled labor	50.5	man		St/10x7.8
	Gathering sand	unskilled labor	23.6	man		Sa/10x7.8
2	Stone Masonry		60.0	m^3	Vs	
	rubble stone		64.8	m^3		Vs x 1.08
	sand		26.4	m^3		Vs x 0.5 x 1.1 x 0.8
	cement	ordinary portland	297.0	bag		Vs x 0.5 x 1.1 x 9
	excavation	unskilled labor	7.8	man		/10m^3
	mortar mixing	unskilled labor	198.0	man		Vs x 0.5 x 1.1 x 6
	stone masonry	foreman	18.0	man		0.3 x Vs
		skilled labor	36.0	man		0.6 x Vs
		unskilled labor	216.0	man		3.6 x Vs
3	Rehabilitation of embankment		0.0	m^3	Ve	excavated material
	embankment	unskilled labor	0.0	man		Ve/10*7.6
4	De-silting		0.0	m^3	Vd	
	excavation	unskilled labor	0.0	man		Vd/10*7.8
5	Construction of canal	W=0.36 D=0.38	100.0	m	Lc	
	bricks		6,085.0	pcs		730.2xLc/12
	sand		2.7	m^3		0.37xLc/12x0.8x1.1
	cement	ordinary portland	30.5	bag		0.37xLc/12x9x1.1
	excavation	unskilled labor	3.1	man		Lc*0.24/7.8
	mortar mixing	unskilled labor	33.3	man		4xLc/12
	brick laying	skilled labor	8.3	man		1xLc/12
		unskilled labor	75.0	man		9xLc/12
		foreman	8.3	man		1.0/12xLc
6	Main Canal Trapezoid	B=0.3m D=0.3m	2,000.0	m		excavation
	excavation	unskilled labor	421.2	man		Lex0.27/10x7.8
		foreman	20.0	man		Le/100

No.	Item	Specification/Quality	Quantity	Unit		Remarks
7	Gully Crossing	Box 600 x 600 x 475	8.0	pcs	Ngx2	
	bricks		1,784.0	pcs		223.0xNgx2
	sand		1.1	m^3		0.16x0.8xNgx2x1.1
	cement		11.5	bag		0.16xNgx2x9x1.1
	PVC pipe	φ200	4.0	pc		6m/Ng
	excavation	unskilled labor	2.6	man		0.33xNgx2
	mortar mixing	unskilled labor	16.0	man		2.0xNgx2
	brick laying	foreman	2.6	man		0.33xNgx2
		skilled labor	2.6	man		0.33xNgx2
		unskilled labor	5.4	man		0.67xNgx2
8	Transportation	Tractor trailer	9.0	day	stones	St/4/2trips
	loading and unloading	unskilled labor	72.0	man	stones	8men/day
		Oxcart	6.0	day	bricks	1500pcs/day
	loading and unloading	unskilled labor	30.0	man	bricks	5men/day
9	Fuel	diesel	270.0	lit		30lit/day
	Total Material					
	rubble stone		64.8	m^3	St	
	sand		30.2	m^3	Sa	
	cement	ordinary portland	340.0	bag		
	bricks		7,869.0	pcs		
	PVC pipe	φ200 class6	4.0	pcs		
	fuel	diesel	270.0	lit		
	Total Labor					
	foreman		49.0	man		AEDO
	skilled labor		47.0	man		if employed
	unskilled labor		1170.0	man		Farmers
10	Constructionm of embankment		15,600.0	m^3	V	200m^3/day
		Fuel	46,800.0	lit		V/200*600
		Operator	312.0	man		V/200*4
		foreman	78.0	man		V/200
	Construction of embankment		per day			200m^3/day
	Backhoe	0.6m^3	1.0			
	Bulldozer		1.0			
	Dumptruck	10t	2.0			
		fuel	600.0	lit		150lit/day
		operator	4.0	man		
		foreman	1.0	man		

Table A7-6 (3) Quantity of Rehabilitation Work under D/P (Motorized Pump)

No.	Item	Specification/Quality	Quantity	Unit		Remarks
	Construction of main canal		1,500.0	m	Lc	
	Discharge box	1000x1000x855	6.0	pc	Nd	
	Gully crossing		8.0	set	Ng	
	Installation of pipes	ϕ 90	600.0	m	Lp	
	Motorized pump	10HP	1.0	set	Np	
1	Preparation Work					
	Site clearing	unskilled labor	15.0	m･d		1day
	Gathering sand	unskilled labor	35.0	man		Sa/10x7.8
2	Main Canal Rectangular	W=0.36 D=0.38	1,500.0	m	Lc	
	bricks		91,275.0	pcs		730.2/12xLc
	sand		40.7	m^3		0.37/12x0.8xLcx1.1
	cement	ordinary portland	457.9	bag		0.37/12x9xLcx1.1
	excavation	unskilled labor	46.2	man		Lc*0.24/7.8
	mortar mixing	unskilled labor	500.0	man		4xLc/12
	brick laying	skilled labor	125.0	man		1xLc/12
		unskilled labor	1,125.0	man		9*Lc/12
		foreman	125.0	man		1.0/12xLc
3	Discharge box	1000x1000x855	6.0		Nd	
	bricks		3,216.0	pcs		536xNd
	sand		1.9	m^3		0.36x0.8xNdx1.1
	cement	ordinary portland	21.4	bag		0.36x9xNdx1.1
	excavation	unskilled labor	6.0	man		1.0xNd
	mortar mixing	unskilled labor	24.0	man		4.0xNd
	brick laying	skilled labor	6.0	man		1.0xNd
		unskilled labor	24.0	man		4.0xNd
		foreman	6.0	man		1.0xNd
4	Gully Crossing	Box 600 x 600 x 475	16.0	pcs	Ngx2	
	bricks		3,568.0	pcs		223.0x2xNg
	sand		2.3	m^3		0.16x0.8x2xNgx1.1
	cement		25.3	bag		0.16x9x2xNgx1.1
	PVC pipe	ϕ 200	8.0	pc		6m
	excavation	unskilled labor	5.3	man		0.33x2xNg
	mortar mixing	unskilled labor	32.0	man		2.0x2xNg
	brick laying	foreman	5.3	man		0.33x2xNg
		skilled labor	5.3	man		0.33x2xNg
		unskilled labor	10.7	man		0.67x2xNg

No.	Item	Specification/Quality	Quantity	Unit		Remarks
5	Pipe Installation	φ90	600.0	m	Lp	
	excavation	unskilled labor	84.2	man		0.18/10x7.8xLp
	backfill	unskilled labor	49.7	man		0.18/10x4.6xLp
	pipe installation	unskilled labor	45.0	man		7.5man/100m
		foreman	12.0	man		1.0/50xLp
	PVC pipe	φ90	100.0	本		Lc/6
6	Motorized pump	10HP	1.0	set		
7	Transportation brick	Tractor trailer	14.0	day	50.0%	3600pcs/day
	loading and unloading	unskilled labor	56.0	man		8man/day
	Transportation brick	oxcart	33.0	day	50.0%	1500pcs/day
	loading and unloading	unskilled labor	82.5	man		5man/day
8	Others					
	Total Material					
	sand		44.9	m^3	Sa	
	cement	ordinary portland	505.0	bag		
	bricks		98,059.0	pcs		
	PVC pipe	φ90 class6	100.0	pcs		
	PVC pipe	φ200 class6	8.0	pcs		
	fuel	diesel	420.0	lit		30lit/day
	Total Labor					
	foreman		148.0	man		AEDO
	skilled labor		136.0	man		if employed
	unskilled labor		2141.0	man		Farmers

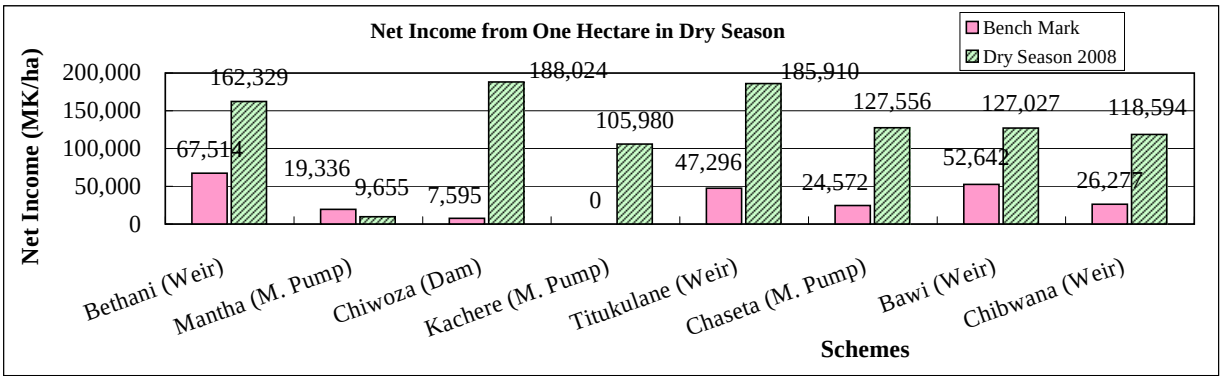
APPENDIX 8

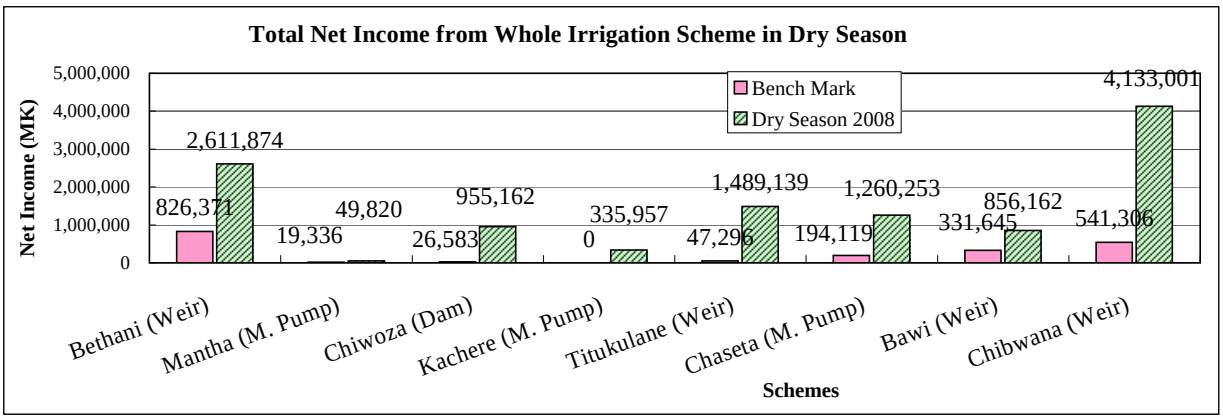
AGRO-ECONOMY

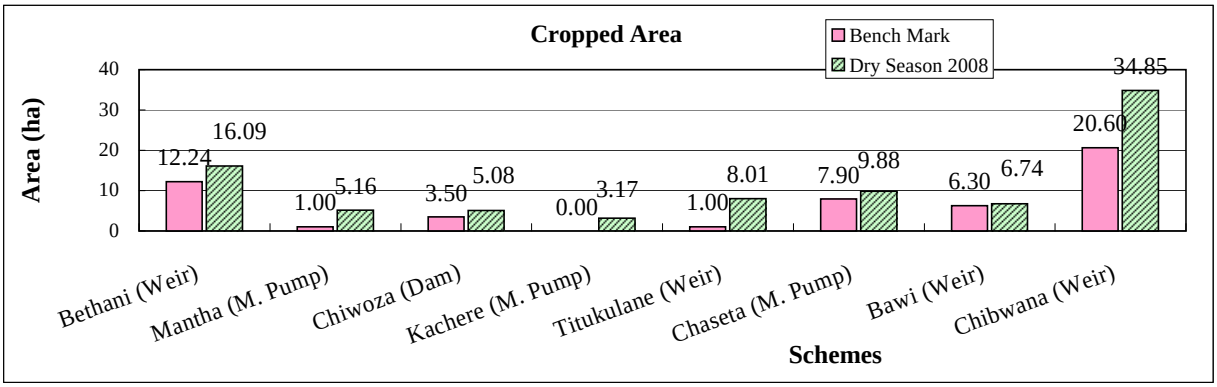
APPENDIX 8 AGRO-ECONOMY

Contents

Figure A8-1 Net Income Comparison between Bench Mark and Dry Season 2008







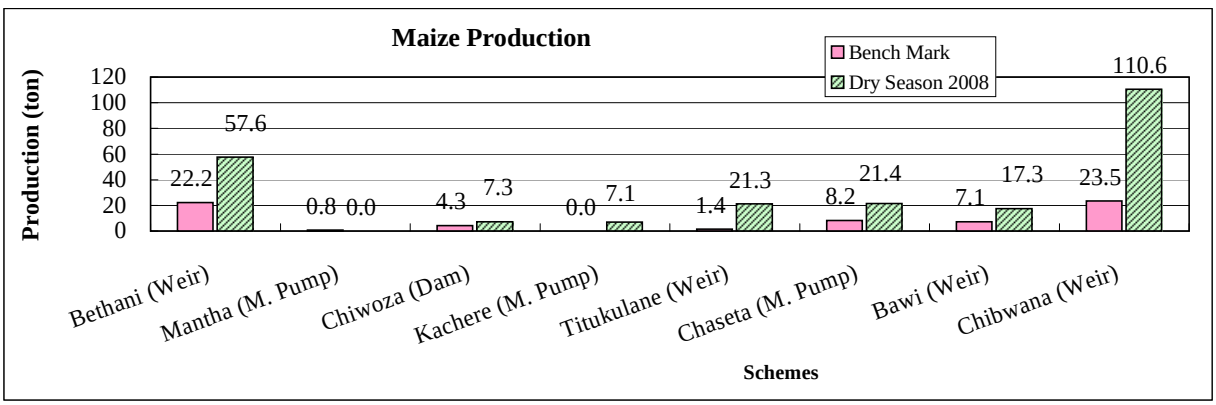
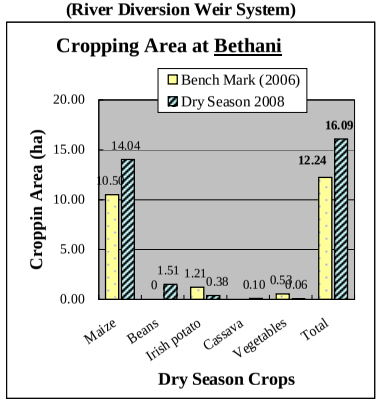
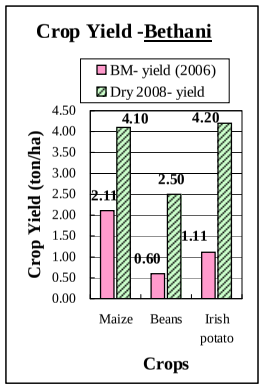


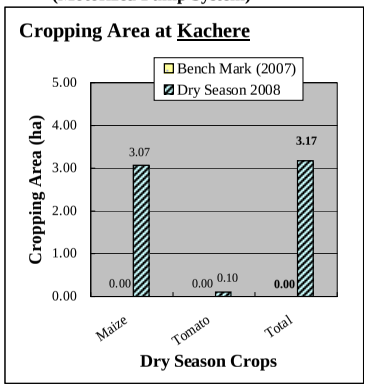
Figure A8-2 Result of Dry Season Cropping - Bench Mark vs Dry Season 2008

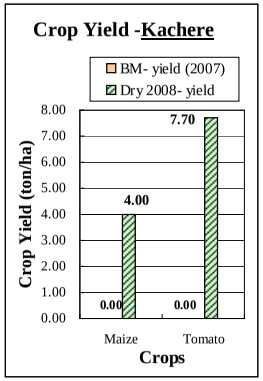
(River Diversion Weir System)



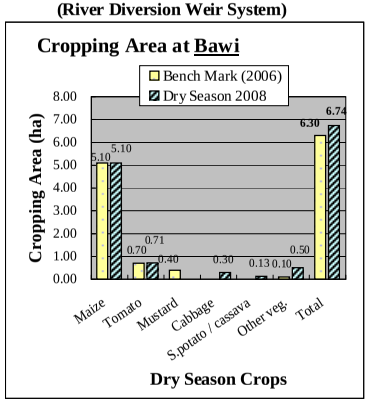


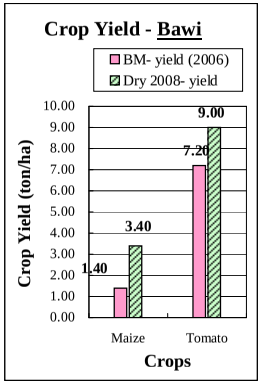
(Motorized Pump System)



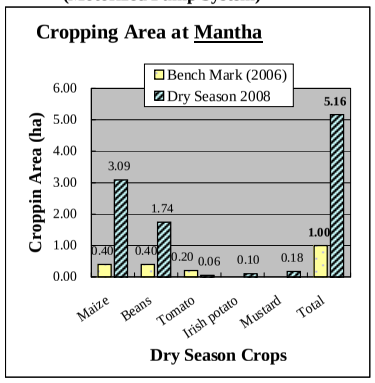


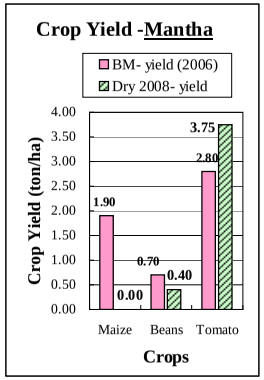
(River Diversion Weir System)





(Motorized Pump System)





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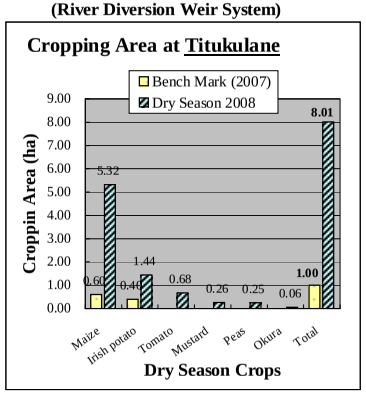

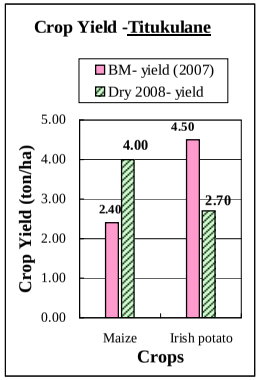

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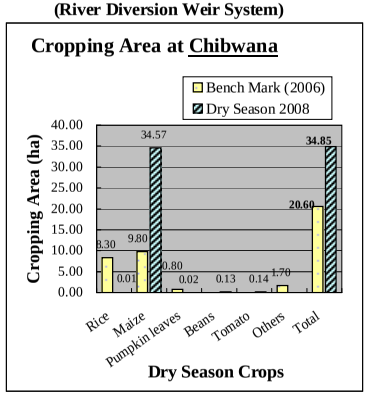

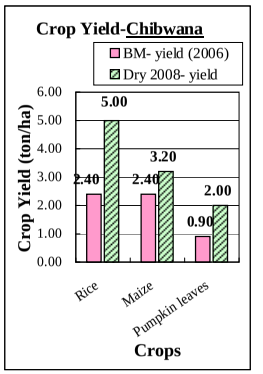

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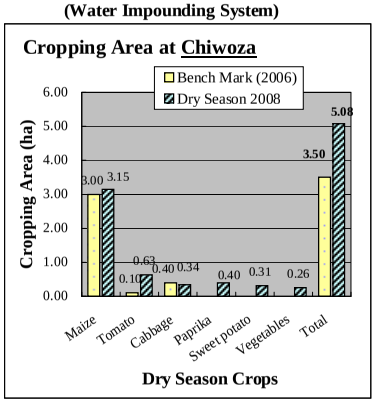

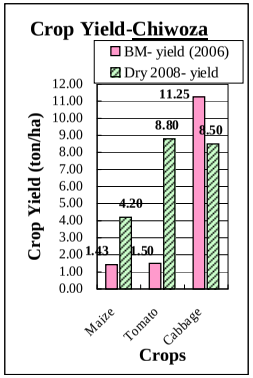

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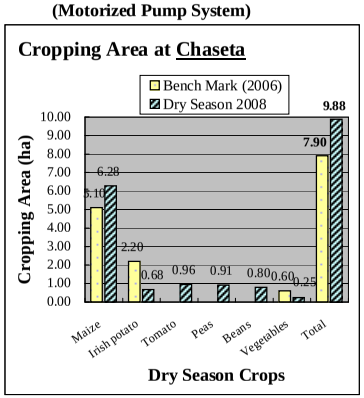


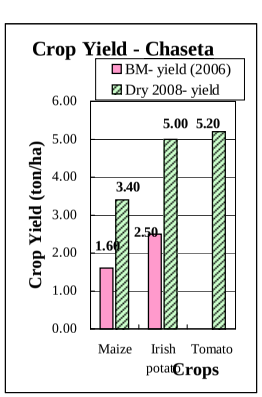


Table A8-1 Whole Farm Net Income for Dry Crops 2008

(1) Bethani Scheme

		Unit	Gravity Irrigation				Total
			Grain Maize	Maize Green	Beans	Irish potato	
A	Gross Income	MK/ha	184,500	350,000	350,000	210,000	
B	Production Costs		54,950	54,950	40,020	54,547	
B-1	Farm Input Costs	MK/ha	54,950	54,950	40,020	54,547	
B-2	Irrigation Costs	MK/ha	0	0	0	0	
	Net Income per crop	MK/ha	129,550	295,050	309,980	155,453	
	Area per crop	ha	12.64	1.40	1.57	0.48	16.09
	Total Net Income by crop	MK	1,637,512	413,070	486,669	74,618	
C	Total net Income for Scheme	MK	2,611,868				
D	**Net Income per ha**	**MK/ha**	**162,329**				

(2) Mantha Scheme

	Items	Unit	Gravity Irrigation			Motorized Pump			Total
			Mustard	Tomato	Beans	Grain Maize	Green Maize	Irish potato	
A	Gross Income	MK/ha	332,500	150,000	56,000	0	200,000	0	
B	Production Costs		80,138	115,544	40,020	57,963	57,963	56,889	
B-1	Farm Input Costs	MK/ha	80,138	115,544	40,020	54,950	54,950	54,547	
B-2	Irrigation Costs	MK/ha	0	0	0	3,013	3,013	2,343	
	Net Income per crop	MK/ha	252,362	34,456	15,980	-57,963	142,037	-56,889	
	Area per crop	ha	0.18	0.06	1.74	2.29	0.80	0.10	5.16
	Total Net Income by crop	MK	44,920	1,930	27,805	-132,736	113,629	-5,689	
		MK	74,655			-24,796			
C	Total Net Income for Scheme	MK	49,860						
D	**Net Income per ha**	**MK/ha**	**9,655**						

(3) Chiwoza Dam

	Items	Unit	Gravity Irrigation							Motorized Pump Irrigation		Total
			Grain Maize	Green Maize	Tomato	Cabbage	Paprika	Sweet Potato	Vegetables	Grain Maize	Green Maize	
A	Gross Income	MK/ha	210,000	490,000	352,000	212,500	400,000	210,000	332,500	146,250	490,000	
B	Production Costs		54,950	54,950	115,544	135,673	51,927	3,297	80,138	146,235	146,235	
B-1	Farm Input Costs	MK/ha	54,950	54,950	115,544	135,673	51,927	3,297	80,138	54,950	54,950	
B-2	Irrigation Costs	MK/ha	0	0	0	0	0	0	0	91,285	91,285	
	Net Income per crop	MK/ha	155,050	435,050	236,456	76,827	348,073	206,703	252,362	15	343,765	
	Area per crop	ha	1.92	0.38	0.63	0.34	0.40	0.31	0.26	0.70	0.14	5.08
	Total Net Income by crop	MK	297,696	165,319	148,967	26,121	139,229	64,078	65,614	11	48,127	
C	Total Net Income for Scheme	MK	907,025							48,138		
	Total	MK	955,162									
D	**Net Income per ha**	**MK/ha**	**188,024**									

(4) Kachere Scheme

		Motorized Pump Irrigation			Total
		Unit	Grain Maize	Green Maize	Tomato	
A	Gross Income	MK/ha	200,000	400,000	385,000	
B	Production Costs	MK/ha	147,753	147,753	169,420	
B-1	Farm Input Costs	MK/ha	54,950	54,950	115,544	
B-2	Irrigation Costs	MK/ha	92,803	92,803	53,876	
	Net Income per crop	MK/ha	52,247	252,247	215,580	
	Area per crop	ha	2.30	0.77	0.10	3.17
	Total Net Income by crop	MK	120,168	194,230	21,558	
C	Total Net Income for Scheme	MK	335,956			
D	**Net Income per ha**	**MK/ha**	**105,980**			

(5) Titukulane Scheme

	Items	Unit	Gravity Irrigation						Total
			Grain Maize	Maize Green	Irish potato	Tomato	Mustard	Peas	
A	Gross Income	MK/ha	220,000	250,000	283,500	367,500	332,500	294,000	
B	Production Costs		54,950	54,950	54,547	115,544	268,488	40,020	
B-1	Farm Input Costs	MK/ha	54,950	54,950	54,547	115,544	268,488	40,020	
B-2	Irrigation Costs	MK/ha	0	0	0	0	0	0	
	Net Income per crop	MK/ha	165,050	195,050	228,953	251,956	64,012	253,980	
	Area per crop	ha	4.82	0.50	1.44	0.68	0.26	0.31	8.01
	Total Net Income by crop	MK	795,541	97,525	329,693	170,070	16,643	78,734	
C	Total Net Income for Scheme	MK	1,488,206						
D	**Net Income per ha**	**MK/ha**	**185,910**						

(6) Chaseta Scheme

	Items	Unit	Watering canes							Total
			Grain maize	Maize Green	Irish potato	Tomato	Peas	Beans	Vegetables	
A	Gross Income	MK/ha	144,000	190,000	250,000	208,000	330,000	196,000	332,500	
B	Production Costs		54,950	54,950	54,547	115,544	40,020	40,020	80,138	
B-1	Farm Input Costs	MK/ha	54,950	54,950	54,547	115,544	40,020	40,020	80,138	
B-2	Irrigation Costs	MK/ha	0	0	0	0	0	0	0	
	Net Income per crop	MK/ha	89,050	135,050	195,453	92,456	289,980	155,980	252,362	
	Area per crop	ha	5.68	0.60	0.68	0.96	0.91	0.80	0.25	9.88
	Total Net Income by crop	MK	505,804	81,030	132,908	88,758	263,882	124,784	63,091	
C	Total Net Income for Scheme	MK	1,260,256							
D	**Net Income per ha**	**MK/ha**	**127,556**							

(7) Bawi Scheme

	Items	Unit	Gravity Irrigation						Total
			Maize Grain	Maize Green	Tomato	Cabbage	Sweet potato	Vegetables	
A	Gross Income	MK/ha	153,000	125,000	360,000	174,000	505,421	332,500	
B	Production Costs		54,950	54,950	115,544	135,673	54,547	80,138	
B-1	Farm Input Costs	MK/ha	54,950	54,950	115,544	135,673	54,547	80,138	
B-2	Irrigation Costs	MK/ha	0	0	0	0	0	0	
	Net Income per crop	MK/ha	98,050	70,050	244,456	38,327	450,874	252,362	
	Area per crop	ha	4.60	0.50	0.71	0.30	0.13	0.50	6.74
	Total Net Income by crop	MK	451,030	35,025	173,564	11,498	58,614	126,686	
C	Total Net Income for Scheme	MK	856,416						
D	**Net Income per ha**	**MK/ha**	**127,027**						

(8) Chibwana Scheme

	Items	Unit	Gravity Irrigation						Total
			Maize Grain	Maize Green	Beans	Tomato	Rice	Pumpkin leaves	
A	Gross Income	MK/ha	160,000	296,250	196,000	120,000	400,000	190,000	
B	Production Costs		54,950	54,950	40,020	115,544	33,000	80,138	
B-1	Farm Input Costs	MK/ha	54,950	54,950	40,020	115,544	33,000	80,138	
B-2	Irrigation Costs	MK/ha	0	0	0	0	0	0	
	Net Income per crop	MK/ha	105,050	241,300	155,980	4,456	367,000	109,862	
	Area per crop	ha	31.07	3.50	0.13	0.14	0.01	0.02	34.86
	Total Net Income by crop	MK	3,263,904	844,550	19,498	610	3,670	2,197	
C	Total Net Income for Scheme	MK	4,134,429						
D	**Net Income per ha**	**MK/ha**	**118,594**						

Table A8-2 (1/8) Net Income for Dry Crops 2008, Bethani

1) Grain Maize

Items		Dry Season			
		Gravity			
		Quantity/Unit		Unit Price (MK)	Value (MK/ha)
A	Gross Income	4,100	kg/ha	45	184,500
B	Production Costs				54,950
B-1	Farm Inputs Costs				54,950
	1) Seed	25	kg/ha	310	7,750
	2) Fertilizer (23:21:0 + 4s)	100	kg/ha	205	20,500
	3) Fertilizer (UREA)	150	kg/ha	178	26,700
	4) Fertilizer (D-Compound)	0	kg/ha	0	0
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**129,550**

2) Green maize - Gravity Irrigation

Items for Maize (Green-Hybrid)		Dry Season			
		Gravity			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	20,000	cobs/ha	17.5	350,000
B	Production Costs				54,950
B-1	Farm Inputs				54,950
	1) Seed	25	kg/ha	310	7,750
	2) Fertilizer (23:21:0 + 4s)	100	kg/ha	205	20,500
	3) Fertilizer (UREA)	150	kg/ha	178	26,700
	4) Fertilizer (D-Compound)	0	kg/ha	0	0
	Net Income (A -B1)				295,050
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**295,050**

3) Beans

Items		Dry Season			
		Gravity			
		Quantity/Unit		Unit Price (MK)	Value (MK/ha)
A	Gross Income	2,500	kg/ha	140	350,000
B	Production Costs				40,020
B-1	Farm Inputs Costs				40,020
	1) Seed	50	kg/ha	130	6,500
	2) Fertilizer (23:21:0 + 4s)	100	kg/ha	205	20,500
	3) Daconil (controls Anthracnose, angular lea	1.75	kg/ha	2,000	3,500
	4) Carbaryl (controls Stem maggots, beetle)	1.70	kg/ha	1,600	2,720
	5) Dimethoate (controls aphids)	4.25	kg/ha	1,600	6,800
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**309,980**

4) Irish Potato

Items		Dry Season			
		Gravity			
		Quantity/Unit		Unit Price (MK)	Value (MK/ha)
A	Gross Income	4,200	kg/ha	50.00	210,000
B	Production Costs				54,547
B-1	Farm Inputs Costs				54,547
	1) Seed	138	kg/ha	23.89	3,297
	2) Fertilizer (23:21:0 + 4s)	250	kg/ha	205.00	51,250
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**155,453**

Table A8-2 (2/8) Net Income for Dry Crops 2008, Mantha

1) Grain maize - Motorized Pump

Items for Maize (Grain-Hybrid)		Dry Season			
		Pump Irrigation			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	0	kg/ha		0
B	Production Costs				57,963
B-1	Farm Inputs				54,950
	1) Seed	25	kg/ha	310	7,750
	2) Fertilizer (23:21:0 + 4s)	100	kg/ha	205	20,500
	3) Fertilizer (UREA)	150	kg/ha	178	26,700
	4) Fertilizer (D-Compound)	0	kg/ha	0	0
B-2	Irrigation Costs				3,013
	1) Fuel consumption	13	liters/ha	234.5	3,013
	2) Maintenance costs (lubricants)		MK/ha	0	0
C	**Net Income (A -B)**				**-57,963**

2) Green maize - Motorized Pump

Items for Maize (Green-Hybrid)		Dry Season			
		Pump Irrigation			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	10,000	cobs/ha	20.0	200,000
B	Production Costs				57,963
B-1	Farm Inputs				54,950
	1) Seed	25	kg/ha	310	7,750
	2) Fertilizer (23:21:0 + 4s)	100	kg/ha	205	20,500
	3) Fertilizer (UREA)	150	kg/ha	178	26,700
	4) Fertilizer (D-Compound)	0	kg/ha	0	0
B-2	Irrigation Costs				3,013
	1) Fuel consumption	13	liters/ha	234.5	3,013
	2) Maintenance costs (lubricants)		MK/ha	0	0
C	**Net Income (A -B)**				**142,037**

3) Irish Potato - Motorized pump

Items for Irish potato		Dry Season			
		Pump Irrigation			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	0	kg/ha		0
B	Production Costs				56,889
B-1	Farm Inputs				54,547
	1) Seed	138	kg/ha	23.89	3,297
	2) Fertilizer (23:21:0 + 4s)	250	kg/ha	205.00	51,250
	3)		kg/ha		0
B-2	Irrigation Costs				2,343
	1) Fuel consumption	10	liters/ha	234.50	2,343
	2) Maintenance costs (lubricants)		MK/ha	0.00	0
C	**Net Income (A -B)**				**-56,889**

4) Tomato - Watering can

Items for Tomato		Dry Season			
		Watering Can			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	3,750	kg/ha	40	150,000
B	Production Costs				115,544
B-1	Farm Inputs				115,544
	1) Seed	0.30	kg/ha	185,000	55,500
	2) Fertilizer (23:21:0 + 4s)	100.00	kg/ha	205	20,500
	3) Fertilizer (CAN)	200.00	kg/ha	178	35,600
	4) Cypermethrine (Aphids pesticide)	800.00	ml/ha	2	1,344
	5) Dithane (for control of Bright disease)	1.30	kg/ha	2,000	2,600
	6) Khola manure				0
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**34,456**

5) Mustard - Watering can

Items		Dry Season			
		Watering Can			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	3,500.00	kg/ha	95.00	332,500
B	Production Costs				80,138
B-1	Farm Inputs				80,138
	1) Seed	300.00	g/ha	15.67	4,701
	2) Basal fertilizer (S-Compound)	200.00	kg/ha	198.70	39,740
	3) Top dressing fertilizer (CAN)	200.00	kg/ha	178.00	35,600
	4) Actelic (controls aphids, cutworms)	10.00	litres/ha	1.67	17
	5) Daconil (controls leafspot)	20.00	ml/ha	2.00	40
	6) Dithane (controls downy mildew)	20.00	ml/ha	2.00	40
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**252,362**

6) Beans - Watering can

Items for Beans		Dry Season			
		Watering Can			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	400	kg/ha	140	56,000
B	Production Costs				40,020
B-1	Farm Inputs				40,020
	1) Seed	50	kg/ha	130	6,500
	2) Fertilizer (23:21:0 + 4s)	100	kg/ha	205	20,500
	3) Daconil (controls Anthracnose, angular le	1.75	kg/ha	2,000	3,500
	4) Carbaryl (controls Stem maggots, beetle)	1.70	kg/ha	1,600	2,720
	5) Dimethoate (controls aphids)	4.25	kg/ha	1,600	6,800
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**15,980**

Table A8-2 (3/8) Net Income for Dry Crops 2008, Chiwoza

1) Grain Maize - Gravity Irrigation

Items for Maize (Grain-Hybrid)		Dry Season / Gravity			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	4,200	kg/ha	50	210,000
B	Production Costs				54,950
B-1	Farm Inputs				54,950
	1) Seed	25	kg/ha	310	7,750
	2) Fertilizer (23:21:0 + 4s)	100	kg/ha	205	20,500
	3) Fertilizer (UREA)	150	kg/ha	178	26,700
	4) Fertilizer (D-Compound)	0	kg/ha	0	0
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**155,050**

2) Green Maize - Gravity Irrigation

Items for Maize (Green-Hybrid)		Dry Season / Gravity			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	24,500	cobs/ha	20.0	490,000
B	Production Costs				54,950
B-1	Farm Inputs				54,950
	1) Seed	25	kg/ha	310	7,750
	2) Fertilizer (23:21:0 + 4s)	100	kg/ha	205	20,500
	3) Fertilizer (UREA)	150	kg/ha	178	26,700
	4) Fertilizer (D-Compound)	0	kg/ha	0	0
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**435,050**

3) Cabbage - Gravity Irrigation

Items for Cabbage		Dry Season / Gravity			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	8,500	kg/ha	25	212,500
B	Production Costs				135,673
B-1	Farm Inputs				135,673
	1) Seed	0.33	kg/ha	180,000	59,400
	2) Fert. D-Compound (Basal)	267.00	kg/ha	179	47,793
	3) Fertilizer, CAN (top dressing)	160.00	kg/ha	178	28,480
	4) Other		kg/ha	0	0
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**76,827**

4) Tomato - Gravity Irrigation

Items for Tomato		Dry Season / Gravity			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	8,800	kg/ha	40	352,000
B	Production Costs				115,544
B-1	Farm Inputs				115,544
	1) Seed	0.30	kg/ha	185,000	55,500
	2) Fertilizer (23:21:0 + 4s)	100.00	kg/ha	205	20,500
	3) Fertilizer (CAN)	200.00	kg/ha	178	35,600
	4) Cypermethrine (Aphids pesticide)	800.00	ml/ha	2	1,344
	5) Dithane (for control of Bright disease)	1.30	kg/ha	2,000	2,600
	6) Khola manure				
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**236,456**

5) Paprika - Gravity Irrigation

Items for Paprika		Dry Season / Gravity			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	2,000.00	kg/ha	200.00	400,000
B	Production Costs				51,927
B-1	Farm Inputs				51,927
	1) Seed	750.00	g/ha	1.12	840
	2) Basal fertilizer (D-Compound)	125.00	kg/ha	179.00	22,375
	3) First top dressing fertilizer (UREA)	50.00	kg/ha	177.80	8,890
	4) Second top dressing fertilizer (CAN)	50.00	kg/ha	178.00	8,900
	5) Third top dressing fertilizer (K2SO2)	50.00	kg/ha	177.80	8,890
	6) Disease control (Dithane applic.)	176.06	g/ha	2.00	352
	7) Pest control (Cypermethrin applic.)	1,000.00	ml/ha	1.68	1,680
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**348,073**

6) Vegetables - Gravity Irrigation

Items for Mustard		Dry Season / Gravity			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	3,500.00	kg/ha	95.00	332,500
B	Production Costs				80,138
B-1	Farm Inputs				80,138
	1) Seed	300.00	g/ha	15.67	4,701
	2) Basal fertilizer (S-Compound)	200.00	kg/ha	198.70	39,740
	3) Top dressing fertilizer (CAN)	200.00	kg/ha	178.00	35,600
	4) Actelic (controls aphids, cutworms)	10.00	litres/ha	1.67	17
	5) Daconil (controls leafspot)	20.00	ml/ha	2.00	40
	6) Dithane (controls downy mildew)	20.00	ml/ha	2.00	40
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**252,362**

7) Sweet potato Potato - Gravity Irrigation

Items for Irish potato		Dry Season / Gravity			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	4,200	kg/ha	50.00	210,000
B	Production Costs				3,297
B-1	Farm Inputs				3,297
	1) Seed	138	kg/ha	23.89	3,297
	2)		kg/ha		0
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**206,703**

8) Grain Maize - Motorized Pump

Items for Maize (Grain-Hybrid)		Dry Season / Pump Irrigation			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	3,250	kg/ha	45	146,250
B	Production Costs				146,235
B-1	Farm Inputs				54,950
	1) Seed	25	kg/ha	310	7,750
	2) Fertilizer (23:21:0 + 4s)	100	kg/ha	205	20,500
	3) Fertilizer (UREA)	150	kg/ha	178	26,700
	4) Fertilizer (D-Compound)	0	kg/ha	0	0
B-2	Irrigation Costs				91,285
	1) Fuel consumption	310	liters/ha	234.5	72,695
	2) Maintenance costs (lubricants)		MK/ha	18,590	18,590
C	**Net Income (A -B)**				**15**

9) Green Maize - Motorized Pump

Items for Maize (Green-Hybrid)		Dry Season / Pump Irrigation			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	24,500	cobs/ha	20.0	490,000
B	Production Costs				146,235
B-1	Farm Inputs				54,950
	1) Seed	25	kg/ha	310	7,750
	2) Fertilizer (23:21:0 + 4s)	100	kg/ha	205	20,500
	3) Fertilizer (UREA)	150	kg/ha	178	26,700
	4) Fertilizer (D-Compound)	0	kg/ha	0	0
B-2	Irrigation Costs				91,285
	1) Fuel consumption	310	liters/ha	234.5	72,695
	2) Maintenance costs (lubricants)		MK/ha	18,590	18,590
C	**Net Income (A -B)**				**343,765**

Table A8-2 (4/8) Net Income for Dry Crops 2008, Kachere

1) Grain maize - Motorized Pump

Items for Maize (Grain-Hybrid)		Dry Season			
		Pump Irrigation			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	4,000	kg/ha	50	200,000
B	Production Costs				147,753
B-1	Farm Inputs				54,950
	1) Seed	25	kg/ha	310	7,750
	2) Fertilizer (23:21:0 + 4s)	100	kg/ha	205	20,500
	3) Fertilizer (UREA)	150	kg/ha	178	26,700
	4) Fertilizer (D-Compound)	0	kg/ha	0	0
B-2	Irrigation Costs				92,803
	1) Fuel consumption	374	liters/ha	234.5	87,703
	2) Maintenance costs (lubricants)		MK/ha	5,100	5,100
C	**Net Income (A -B)**				**52,247**

2) Green maize - Motorized Pump

Items for Maize (Green-Hybrid)		Dry Season			
		Pump Irrigation			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	20,000	cobs/ha	20.0	400,000
B	Production Costs				147,753
B-1	Farm Inputs				54,950
	1) Seed	25	kg/ha	310	7,750
	2) Fertilizer (23:21:0 + 4s)	100	kg/ha	205	20,500
	3) Fertilizer (UREA)	150	kg/ha	178	26,700
	4) Fertilizer (D-Compound)	0	kg/ha	0	0
B-2	Irrigation Costs				92,803
	1) Fuel consumption	374	liters/ha	234.5	87,703
	2) Maintenance costs (lubricants)		MK/ha	5,100	5,100
C	**Net Income (A -B)**				**252,247**

3) Tomato - Motorized Pump

Items for Tomato		Dry Season			
		Pump Irrigation			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	7,700	kg/ha	50	385,000
B	Production Costs				169,420
B-1	Farm Inputs				115,544
	1) Seed	0.30	kg/ha	185,000	55,500
	2) Fertilizer (23:21:0 + 4s)	100.00	kg/ha	205	20,500
	3) Fertilizer (CAN)	200.00	kg/ha	178	35,600
	4) Cypermethrine (Aphids pesticide)	800.00	ml/ha	2	1,344
	5) Dithane (for control of Bright disease)	1.30	kg/ha	2,000	2,600
	6) Khola manure				
B-2	Irrigation Costs				53,876
	1) Fuel consumption	208	liters/ha	234.5	48,776
	2) Maintenance costs (lubricants)		MK/ha	5,100	5,100
C	**Net Income (A -B)**				**215,580**

Table A8-2 (5/8) Net Income for Dry Crops 2008, Titukulane

1) Grain Maize

Items		Dry Season Gravity			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	4,000	kg/ha	55	220,000
B	Production Costs				54,950
B-1	Farm Inputs				54,950
	1) Seed	25	kg/ha	310	7,750
	2) Fertilizer (23:21:0 + 4s)	100	kg/ha	205	20,500
	3) Fertilizer (UREA)	150	kg/ha	178	26,700
	4) Fertilizer (D-Compound)	0	kg/ha	0	0
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**165,050**

2) Green maize - Gravity Irrigation

Items for Maize (Green-Hybrid)		Dry Season Gravity			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	20,000	cobs/ha	12.5	250,000
B	Production Costs				54,950
B-1	Farm Inputs				54,950
	1) Seed	25	kg/ha	310	7,750
	2) Fertilizer (23:21:0 + 4s)	100	kg/ha	205	20,500
	3) Fertilizer (UREA)	150	kg/ha	178	26,700
	4) Fertilizer (D-Compound)	0	kg/ha	0	0
	Net Income (A -B1)				195,050
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**195,050**

3) Irish potato

Items for Irish potato		Dry Season Gravity			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	2,700	kg/ha	105.00	283,500
B	Production Costs				54,547
B-1	Farm Inputs				54,547
	1) Seed	138	kg/ha	23.89	3,297
	2) Fertilizer (23:21:0 + 4s)	250	kg/ha	205.00	51,250
	3)		kg/ha		0
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**228,953**

4) Tomato

Items for Tomato		Dry Season Gravity			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	7,350	kg/ha	50	367,500
B	Production Costs				115,544
B-1	Farm Inputs				115,544
	1) Seed	0.30	kg/ha	185,000	55,500
	2) Fertilizer (23:21:0 + 4s)	100.00	kg/ha	205	20,500
	3) Fertilizer (CAN)	200.00	kg/ha	178	35,600
	4) Cypermethrine (Aphids pesticide)	800.00	ml/ha	2	1,344
	5) Dithane (for control of Bright disease)	1.30	kg/ha	2,000	2,600
	6) Khola manure				
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**251,956**

5) Mustard

Items		Dry Season Gravity			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	3,500.00	kg/ha	95.00	332,500
B	Production Costs				268,488
B-1	Farm Inputs				268,488
	1) Seed	300.00	g/ha	15.67	4,701
	2) Basal fertilizer (S-Compound)	700.00	kg/ha	198.70	139,090
	3) Top dressing fertilizer (CAN)	700.00	kg/ha	178.00	124,600
	4) Actelic (controls aphids, cutworms)	10.00	litres/ha	1.67	17
	5) Daconil (controls leafspot)	20.00	ml/ha	2.00	40
	6) Dithane (controls downy mildew)	20.00	ml/ha	2.00	40
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**64,012**

6) Peas - Watering can

Items for Peas		Dry Season Gravity			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	2,100	kg/ha	140	294,000
B	Production Costs				40,020
B-1	Farm Inputs				40,020
	1) Seed	50	kg/ha	130	6,500
	2) Fertilizer (23:21:0 + 4s)	100	kg/ha	205	20,500
	3) Daconil (controls Anthracnose, angular leaf	1.75	kg/ha	2,000	3,500
	4) Carbaryl (controls Stem maggots, beetle)	1.70	kg/ha	1,600	2,720
	5) Dimethoate (controls aphids)	4.25	kg/ha	1,600	6,800
B-2	Irrigation Costs				0
Case-1	**Net Income (A -B)**				**253,980**

Table A8-2 (6/8) Net Income for Dry Crops 2008, chaseta

1) Grain Maize - Watering can

Items for Maize (Grain-Hybrid)		Dry Season			
		Watering Can			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	3,200	kg/ha	45	144,000
B	Production Costs				54,950
B-1	Farm Inputs				54,950
	1) Seed	25	kg/ha	310	7,750
	2) Fertilizer (23:21:0 + 4s)	100	kg/ha	205	20,500
	3) Fertilizer (UREA)	150	kg/ha	178	26,700
	4) Fertilizer (D-Compound)	0	kg/ha	0	0
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**89,050**

2) Green maize - Watering can

Items for Maize (Green-Hybrid)		Dry Season			
		Watering Can			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	19,000	cobs/ha	10.0	190,000
B	Production Costs				54,950
B-1	Farm Inputs				54,950
	1) Seed	25	kg/ha	310	7,750
	2) Fertilizer (23:21:0 + 4s)	100	kg/ha	205	20,500
	3) Fertilizer (UREA)	150	kg/ha	178	26,700
	4) Fertilizer (D-Compound)	0	kg/ha	0	0
	Net Income (A -B1)				135,050
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**135,050**

3) Irish Potato - Watering can

Items for Irish potato		Dry Season			
		Watering Can			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	5,000	kg/ha	50.00	250,000
B	Production Costs				54,547
B-1	Farm Inputs				54,547
	1) Seed	138	kg/ha	23.89	3,297
	2) Fertilizer (23:21:0 + 4s)	250	kg/ha	205.00	51,250
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**195,453**

4) Tomato - Watering can

Items for Tomato		Dry Season			
		Watering Can			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	5,200	kg/ha	40	208,000
B	Production Costs				115,544
B-1	Farm Inputs				115,544
	1) Seed	0.30	kg/ha	185,000	55,500
	2) Fertilizer (23:21:0 + 4s)	100.00	kg/ha	205	20,500
	3) Fertilizer (CAN)	200.00	kg/ha	178	35,600
	4) Cypermethrine (Aphids pesticide)	800.00	ml/ha	2	1,344
	5) Dithane (for control of Bright disease)	1.30	kg/ha	2,000	2,600
	6) Khola manure				0
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**92,456**

5) Peas - Watering can

Items for Peas		Dry Season			
		Watering Can			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	2,200	kg/ha	150	330,000
B	Production Costs				40,020
B-1	Farm Inputs				40,020
	1) Seed	50	kg/ha	130	6,500
	2) Fertilizer (23:21:0 + 4s)	100	kg/ha	205	20,500
	3) Daconil (controls Anthracnose, angular leaf	1.75	kg/ha	2,000	3,500
	4) Carbaryl (controls Stem maggots, beetle)	1.70	kg/ha	1,600	2,720
	5) Dimethoate (controls aphids)	4.25	kg/ha	1,600	6,800
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**289,980**

6) Beans - Watering can

Items for Beans		Dry Season			
		Watering Can			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	1,400	kg/ha	140	196,000
B	Production Costs				40,020
B-1	Farm Inputs				40,020
	1) Seed	50	kg/ha	130	6,500
	2) Fertilizer (23:21:0 + 4s)	100	kg/ha	205	20,500
	3) Daconil (controls Anthracnose, angular leaf	1.75	kg/ha	2,000	3,500
	4) Carbaryl (controls Stem maggots, beetle)	1.70	kg/ha	1,600	2,720
	5) Dimethoate (controls aphids)	4.25	kg/ha	1,600	6,800
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**155,980**

7) Vegetables - Watering can

Items for Vegetables		Dry Season			
		Watering Can			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	3,500.00	kg/ha	95.00	332,500
B	Production Costs				80,138
B-1	Farm Inputs				80,138
	1) Seed	300.00	g/ha	15.67	4,701
	2) Basal fertilizer (S-Compound)	200.00	kg/ha	198.70	39,740
	3) Top dressing fertilizer (CAN)	200.00	kg/ha	178.00	35,600
	4) Actelic (controls aphids, cutworms)	10.00	litres/ha	1.67	17
	5) Daconil (controls leafspot)	20.00	ml/ha	2.00	40
	6) Dithane (controls downy mildew)	20.00	ml/ha	2.00	40
B-2	Irrigation Costs				
C	**Net Income (A -B)**				**252,362**

Table A8-2 (7/8) Net Income for Dry Crops 2008, Bawi

1) Grain Maize - Gravity Irrigation

Items for Maize (Grain-Hybrid)		Dry Season			
		Gravity			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	3,400	kg/ha	45	153,000
B	Production Costs				54,950
B-1	Farm Inputs				54,950
	1) Seed	25	kg/ha	310	7,750
	2) Fertilizer (23:21:0 + 4s)	100	kg/ha	205	20,500
	3) Fertilizer (UREA)	150	kg/ha	178	26,700
	4) Fertilizer (D-Compound)	0	kg/ha	0	0
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**98,050**

2) Green maize - Gravity Irrigation

Items for Maize (Green-Hybrid)		Dry Season			
		Gravity			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	10,000	cobs/ha	12.5	125,000
B	Production Costs				54,950
B-1	Farm Inputs				54,950
	1) Seed	25	kg/ha	310	7,750
	2) Fertilizer (23:21:0 + 4s)	100	kg/ha	205	20,500
	3) Fertilizer (UREA)	150	kg/ha	178	26,700
	4) Fertilizer (D-Compound)	0	kg/ha	0	0
	Net Income (A -B1)				70,050
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**70,050**

3) Tomato - Gravity Irrigation

Items for Tomato		Dry Season			
		Gravity			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	9,000	kg/ha	40	360,000
B	Production Costs				115,544
B-1	Farm Inputs				115,544
	1) Seed	0.30	kg/ha	185,000	55,500
	2) Fertilizer (23:21:0 + 4s)	100.00	kg/ha	205	20,500
	3) Fertilizer (CAN)	200.00	kg/ha	178	35,600
	4) Cypermethrine (Aphids pesticide)	800.00	ml/ha	2	1,344
	5) Dithane (for control of Bright disease)	1.30	kg/ha	2,000	2,600
	6) Khola manure				0
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**244,456**

4) Cabbage - Gravity Irrigation

Items for Cabbage		Dry Season			
		Gravity			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	8,700	kg/ha	20	174,000
B	Production Costs				135,673
B-1	Farm Inputs				135,673
	1) Seed	0.33	kg/ha	180,000	59,400
	2) Fert. D-Compound (Basal)	267.00	kg/ha	179	47,793
	3) Fertilizer, CAN (top dressing)	160.00	kg/ha	178	28,480
	4) Other		kg/ha	0	0
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**38,327**

5) Sweet Potato - Gravity Irrigation

Items for Irish potato		Dry Season			
		Gravity			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	13,889	kg/ha	36.39	505,421
B	Production Costs				54,547
B-1	Farm Inputs				54,547
	1) Seed	138	kg/ha	23.89	3,297
	2) Fertilizer (23:21:0 + 4s)	250	kg/ha	205.00	51,250
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**450,874**

6) Vegetables - Gravity Irrigation

Items for Vegetables		Dry Season			
		Gravity			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	3,500.00	kg/ha	95.00	332,500
B	Production Costs				80,138
B-1	Farm Inputs				80,138
	1) Seed	300.00	g/ha	15.67	4,701
	2) Basal fertilizer (S-Compound)	200.00	kg/ha	198.70	39,740
	3) Top dressing fertilizer (CAN)	200.00	kg/ha	178.00	35,600
	4) Actelic (controls aphids, cutworms)	10.00	litres/ha	1.67	17
	5) Daconil (controls leafspot)	20.00	ml/ha	2.00	40
	6) Dithane (controls downy mildew)	20.00	ml/ha	2.00	40
B-2	Irrigation Costs				
C	**Net Income (A -B)**				**252,362**

Table A8-2 (8/8) Net Income for Dry Crops 2008, Chibwana

1) Grain Maize - Gravity irrigation

Items for Maize (Grain-Hybrid)		Dry Season			
		Gravity			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	3,200	kg/ha	50	160,000
B	Production Costs				54,950
B-1	Farm Inputs				54,950
	1) Seed	25	kg/ha	310	7,750
	2) Fertilizer (23:21:0 + 4s)	100	kg/ha	205	20,500
	3) Fertilizer (UREA)	150	kg/ha	178	26,700
	4) Fertilizer (D-Compound)	0	kg/ha	0	0
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**105,050**

2) Green maize - Gravity Irrigation

Items for Maize (Green-Hybrid)		Dry Season			
		Gravity			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	23,700	cobs/ha	12.5	296,250
B	Production Costs				54,950
B-1	Farm Inputs				54,950
	1) Seed	25	kg/ha	310	7,750
	2) Fertilizer (23:21:0 + 4s)	100	kg/ha	205	20,500
	3) Fertilizer (UREA)	150	kg/ha	178	26,700
	4) Fertilizer (D-Compound)	0	kg/ha	0	0
	Net Income (A -B1)				241,300
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**241,300**

3) Beans - Gravity irrigation

Items for Beans		Dry Season			
		Gravity			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	1,400	kg/ha	140	196,000
B	Production Costs				40,020
B-1	Farm Inputs				40,020
	1) Seed	50	kg/ha	130	6,500
	2) Fertilizer (23:21:0 + 4s)	100	kg/ha	205	20,500
	3) Daconil (controls Anthracnose, angular leaf	1.75	kg/ha	2,000	3,500
	4) Carbaryl (controls Stem maggots, beetle)	1.70	kg/ha	1,600	2,720
	5) Dimethoate (controls aphids)	4.25	kg/ha	1,600	6,800
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**155,980**

4) Tomato - Gravity irrigation

Items for Tomato		Dry Season			
		Gravity			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	6,000	kg/ha	20	120,000
B	Production Costs				115,544
B-1	Farm Inputs				115,544
	1) Seed	0.30	kg/ha	185,000	55,500
	2) Fertilizer (23:21:0 + 4s)	100.00	kg/ha	205	20,500
	3) Fertilizer (CAN)	200.00	kg/ha	178	35,600
	4) Cypermethrine (Aphids pesticide)	800.00	ml/ha	2	1,344
	5) Dithane (for control of Bright disease)	1.30	kg/ha	2,000	2,600
	6) Khola manure				0
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**4,456**

5) Rice - Gravity irrigation

Items for Cabbage		Dry Season			
		Gravity			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	5,000	kg/ha	80	400,000
B	Production Costs				33,000
B-1	Farm Inputs				33,000
	1) Seed	75.00	kg/ha	48	3,600
	2) Fert. 23:221:0 + 4S (Basal)	100.00	kg/ha	205	20,500
	3) Fertilizer, UREA (top dressing)	50.00	kg/ha	178	8,900
	4) Other		kg/ha	0	0
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**367,000**

6) Pumpkin leaves - Gravity irrigation

Items for pumpkin leaves		Dry Season			
		Gravity			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	2,000	kg/ha	95	190,000
B	Production Costs				80,138
B-1	Farm Inputs				80,138
	1) Seed	300	g/ha	16	4,701
	2) Basal fertilizer (S-Compound)	200	kg/ha	199	39,740
	3) Top dressing fertilizer (CAN)	200	kg/ha	178	35,600
	4) Actelic (controls aphids, cutworms)	10	litres/ha	2	17
	5) Daconil (controls leafspot)	20	ml/ha	2	40
	6) Dithane (controls downy mildew)	20	ml/ha	2	40
B-2	Irrigation Costs				0
C	**Net Income (A -B)**				**109,862**

Table A8-3 Bench-Mark Net Farm Incomes for Verification Sites

Code	Site	Year	Scheme's potential land size	Scheme's total number of farmers	Number of sampled farmers	Area owned per sample farmer	Average Farm Income (GV)	Average Production Cost	Average Farm Net Income	Net Income per ha
			(ha)	(Number)	(Number)	(ha)	(MK/farmer)	(MK/farmer)	(MK/farmer)	(MK/ha)
MZ-11	**Bethani**	**2006**	22	132	30	0.350	25,645	2,239	23,405	67,514
MZ-04	**Mantha**	**2006**	8	100	30	0.080	2,175	661	1,515	19,336
KAS-45	**Chiwoza**	**2006**	10	63	21	0.090	3,564	2,873	691	7,595
KAS-40	**Kachere**	**2007**	6	100	0	0.000	0	0	0	0
KAS-01	**Titukulane**	**2007**	7	64						47,296
LI-02	**Chaseta**	**2006**	12	150	30	0.260	7,711	1,208	6,503	24,572
LI-21	**Bawi**	**2006**	6	49	30	0.360	22,625	3,551	19,074	52,642
MA-01	**Chibwana**	**2006**	34	212	30	0.550	15,388	1,050	14,337	26,277
Average per Scheme			13.21	109	24	0.241	11,015	1,655	9,361	30,654

Table A8-4 Estimated Net Income by Various Crops in Dry Season for A/P and D/P

	Maize (grain)	Maize (green)	Cabbage	Tomato	Paprika	Mustard	Beans	Irish potato
A. Gross Income	146,700	306,250	360,000	456,000	280,000	332,500	196,000	505,421
B. Farm Inputs Costs	54,950	54,950	135,673	115,544	51,927	80,138	40,020	54,547
C. Irrigation Costs								
(1) River Diversion Weir	228	228	228	228	228	228	228	228
(2) Water Impounding Dam	1,023	1,023	1,023	1,023	1,023	1,023	1,023	1,023
(3) Motorized Pump	88,196	88,196	59,118	49,269	78,581	49,269	56,069	68,732
D. Net Income (MK/ha)								
(1) River Diversion Weir A - (B + C(1))	**91,522**	**251,072**	**224,099**	**340,228**	**227,845**	**252,134**	**155,752**	**450,646**
(2) Water Impounding Dam A - (B + C(2))	**90,727**	**250,277**	**223,304**	**339,433**	**227,050**	**251,339**	**154,957**	**449,851**
(3) Motorized Pump A - (B + C(3))	**3,555**	**163,105**	**165,210**	**291,188**	**149,492**	**203,094**	**99,911**	**382,142**

Table A8-5 (1/8) Gross Margin Analysis - Grain Maize

Items for Maize (Grain-Hybrid)		Dry Season Pump Irrigation			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	3,260	kg/ha	45	146,700
B	Farm Input Costs				
	1) Seed	25	kg/ha	310	7,750
	2) Fertilizer (23:21:0 + 4s)	100	kg/ha	205	20,500
	3) Fertilizer (UREA)	150	kg/ha	178	26,700
	4) Fertilizer (D-Compound)	0	kg/ha	0	0
	Sub-total				54,950
C	Irrigation Costs				
(1)	River Diversion Weir				
	1) Maintenance costs		MK/ha	228	228
	Sub-total				228
(2)	Water Impounding Dam				
	1) Maintenance costs		MK/ha	1,023	1,023
	Sub-total				1,023
(3)	Motorized Pump				
	1) Fuel consumption	373	liters/ha	234.5	87,469
	2) Maintenance costs		MK/ha	727	727
	Sub-total				88,196
	Net Income, River Diversion Weir A-(B+C(1))				**91,522**
	Net Income, Water Impounding Dam A-(B(1)+C(2))				**90,727**
	Net Income Motorized Pump A-(B(1)+C(3))				**3,555**

Notes:

1) Seed price was calculated by finding average of current (August 2008) market price for hybrid maize seed.

2) Farm gate price was found by finding average of middlemen's August 2008 buying price in Kasungu district.

3) Fertilizer (23:21:0 + 4s) price was identified by choosing recent (August 2008) market price on the market.

4) Fertilizer (UREA) price was identified by choosing recent (August 2008) market price on the market.

5) Fuel consumption data were based on actual operation at Chiwoza Irrigation Scheme from April to Aug. 2008 for maize planting.

6) Fuel price was market price gas observed on the market (12/08/08) (common to other crops)

7) Maintenance costs were obtained from Table 3-2 of Technical Guideline. Maintenance includes main facility and canal.

8) Planting period is from 15 April 2008 to 30 August 2008

9) Maize production was a real 2008 dry season harvests at Chiwoza site under motorized pump.

Total land size	0.84	ha
Maize yield	3,260.00	kg/ha

Table A8-5 (2/8) Gross Margin Analysis - Green Maize

Items for Maize (Green-Hybrid)		Dry Season Pump Irrigation			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	24,500	cobs/ha	12.5	306,250
B	Farm Input Costs				
	1) Seed	25	kg/ha	310	7,750
	2) Fertilizer (23:21:0 + 4s)	100	kg/ha	205	20,500
	3) Fertilizer (UREA)	150	kg/ha	178	26,700
	4) Fertilizer (D-Compound)	0	kg/ha	0	0
	Sub-total				54,950
C	Irrigation Costs				
(1)	River Diversion Weir				
	1) Maintenance costs		MK/ha	228	228
	Sub-total				228
(2)	Water Impounding Dam				
	1) Maintenance costs		MK/ha	1,023	1,023
	Sub-total				1,023
(3)	Motorized Pump				
	1) Fuel consumption	373	liters/ha	234.5	87,469
	2) Maintenance costs		MK/ha	727	727
	Sub-total				88,196
	Net Income, River Diversion Weir A-(B+C(1))				**251,072**
	Net Income, Water Impounding Dam A-(B(1)+C(2))				**250,277**
	Net Income Motorized Pump A-(B(1)+C(3))				**163,105**

Notes:

1) Seed price was calculated by finding average of current (August 2008) buying prices heard from different buyers from Kasungu vendors.

2) Maize (Green) farm gate price was found by calculating the given information of K20 per cob, Chiwoza Field Trip of 09/08/08 and equate it to 7.4 cobs per kg.

3) Fertilizer (23:21:0 + 4s) price was identified by choosing recent (August 2008) market price on the market.

4) Fertilizer (UREA) price was identified by choosing recent (August 2008) market price on the market.

5) Fuel consumption data were based on actual operation at Chiwoza Irrigation Scheme from April to Aug. 2008 for maize planting.

6) Fuel price was market price gas observed on the market (12/08/08)

7) Maintenance costs were obtained from Table 3-2 of Technical Guideline. Maintenance includes main facility and canal.

8) Planting period is from 15 April 2008 to 30 August 2008

Table A8-5 (3/8) Gross Margin Analysis - Cabbage

Items for Cabbage		Dry Season			
		Pump Irrigation			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	18,000	kg/ha	20	360,000
B	Farm Input Costs				
	1) Seed	0.33	kg/ha	180,000	59,400
	2) Fert. D-Compound (Basal)	267.00	kg/ha	179	47,793
	3) Fertilizer, CAN (top dressing)	160.00	kg/ha	178	28,480
	4) Other		kg/ha	0	0
	Sub-total				135,673
C	Irrigation Costs				
(1)	River Diversion Weir				
	1) Maintenance costs		MK/ha	228	228
	Sub-total				228
(2)	Water Impounding Dam				
	1) Maintenance costs		MK/ha	1,023	1,023
	Sub-total				1,023
(3)	Motorized Pump				
	1) Fuel consumption	249	liters/ha	234.5	58,391
	2) Maintenance costs		MK/ha	727	727
	Sub-total				59,118
	Net Income, River Diversion Weir A-(B+C(1))				**224,099**
	Net Income, Water Impounding Dam A-(B(1)+C(2))				**223,304**
	Net Income Motorized Pump A-(B(1)+C(3))				**165,210**

Notes:

1) Seed price was identified from current and prevailing market prices offered by major seed suppliers in Malawi

2) Cabbage farm gate price was identified from Natural Resource College farm price by actually weighing sampled cabbage heads

3) Cabbage yield was calculated using information provided by owner of Rusagu Vegetable Gardens as visited on 19/08/08

4) Fertilizer (D-Compound) price was identified by choosing recent (August 2008) market price on the market.

5) Fuel consumption was based on actual operation at Chiwoza Irrigation Scheme from April to Aug. 2008 for maize planting.

6) Fuel price was market price gas observed on the market (12/08/08)

7) Maintenance costs were obtained from Table 3-2 of Technical Guideline. Maintenance includes main facility and canal.

8) Fertilizer (CAN) price was identified by choosing recent (August 2008) market price on the market.

Table A8-5 (4/8) Gross Margin Analysis - Tomato

Items for Tomato		Dry Season			
		Pump Irrigation			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	11,400	kg/ha	40	456,000
B	Farm Input Costs				
	1) Seed	0.30	kg/ha	185,000	55,500
	2) Fertilizer (23:21:0 + 4s)	100.00	kg/ha	205	20,500
	3) Fertilizer (CAN)	200.00	kg/ha	178	35,600
	4) Cypermethrine (Aphids pesticide)	800.00	ml/ha	2	1,344
	5) Dithane (for control of Bright disease)	1.30	kg/ha	2,000	2,600
	6) Khola manure				
	Sub-total				115,544
C	Irrigation Costs				
(1)	River Diversion Weir				
	1) Maintenance costs		MK/ha	228	228
	Sub-total				228
(2)	Water Impounding Dam				
	1) Maintenance costs		MK/ha	1,023	1,023
	Sub-total				1,023
(3)	Motorized Pump				
	1) Fuel consumption	207	liters/ha	234.5	48,542
	2) Maintenance costs		MK/ha	727	727
	Sub-total				49,269
	Net Income, River Diversion Weir A-(B+C(1))				**340,228**
	Net Income, Water Impounding Dam A-(B(1)+C(2))				**339,433**
	Net Income Motorized Pump A-(B(1)+C(3))				**291,188**

Notes:

1) Seed price was identified by taking current (August 2008) market price.

2) Tomato farm gate price was identified from the Monitoring Report at the Verification sites

3) Tomato yield was identified from Mlomba EPA crop estimates for 2008 dry period, while percentage loss (20%) when selling was identified from Rusagu Vegetable Gardens

4) Fertilizer (23:21:0 + 4s) price was identified by choosing recent (August 2008) market price on the market.

5) Cypermethylene quantity was identified from Monitoring Reports of Chiwoza Irrigation Scheme

6) Cypermethylene price was identified from Monitoring Reports of Chiwoza Irrigation Scheme

7) Fuel consumption was based on actual operation at Chiwoza Irrigation Scheme from April to Aug. 2008 for maize planting.

7) Maintenance costs were obtained from Table 3-2 of Technical Guideline. Maintenance includes main facility and canal.

9) Dithane price was identified from the practical average prices farmers bought as documented in Monitoring Reports (Chiwoza Irrigation Scheme)

10) Tomato yield had 20% discounted due to losses experienced by farmers when tomato is ready for sale. Thus 14.31 x 0.8 = 11.45

Table A8-5 (5/8) Gross Margin Analysis - Paprika

Items for Paprika		Dry Season			
		Pump Irrigation			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	2,500.00	kg/ha	112.00	280,000
B	Farm Input Costs				
	1) Seed	750.00	g/ha	1.12	840
	2) Basal fertilizer (D-Compound)	125.00	kg/ha	179.00	22,375
	3) First top dressing fertilizer (UREA)	50.00	kg/ha	177.80	8,890
	4) Second top dressing fertilizer (CAN)	50.00	kg/ha	178.00	8,900
	5) Third top dressing fertilizer (K2SO2)	50.00	kg/ha	177.80	8,890
	6) Disease control (Dithane applic.)	176.06	g/ha	2.00	352
	7) Pest control (Cypermethrin applic.)	1,000.00	ml/ha	1.68	1,680
	Sub-total				51,927
C	Irrigation Costs				
(1)	River Diversion Weir				
	1) Maintenance costs		MK/ha	228	228
	Sub-total				228
(2)	Water Impounding Dam				
	1) Maintenance costs		MK/ha	1,023	1,023
	Sub-total				1,023
(3)	Motorized Pump				
	1) Fuel consumption	332	liters/ha	234.5	77,854
	2) Maintenance costs		MK/ha	727	727
	Sub-total				78,581
	Net Income, River Diversion Weir A-(B+C(1))				**227,845**
	Net Income, Water Impounding Dam A-(B(1)+C(2))				**227,050**
	Net Income Motorized Pump A-(B(1)+C(3))				**149,492**

Notes:

1) Seed price was calculated by finding average reported buying prices from farmers (Monitoring Reports)

2) Paprika farm gate price was identified from Paprika Production Manual

3) Paprika yields are smallholder farmer's crop estimates values for 2008, Mlomba EPA, Lilongwe.

4) Fertilizer (D-Compound) price was identified from Chiwoza Field Trip Report of 02/08/08

5) Fertilizer (CAN) price was identified by choosing recent (August 2008) market price on the market.

6) Fuel consumption was based on actual operation at Chiwoza Irrigation Scheme from April to Aug. 2008 for maize planting.

7) Maintenance costs were obtained from Table 3-2 of Technical Guideline. Maintenance includes main facility and canal.

8) Fertilizer (UREA) price was identified by choosing recent (August 2008) market price on the market.

Table A8-5 (6/8) Gross Margin Analysis - Mustard

Items for Mustard		Dry Season			
		Pump Irrigation			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	3,500.00	kg/ha	95.00	332,500
B	Farm Input Cost				
	1) Seed	300.00	g/ha	15.67	4,701
	2) Basal fertilizer (S-Compound)	200.00	kg/ha	198.70	39,740
	3) Top dressing fertilizer (CAN)	200.00	kg/ha	178.00	35,600
	4) Actelic (controls aphids, cutworms)	10.00	litres/ha	1.67	17
	5) Daconil (controls leafspot)	20.00	ml/ha	2.00	40
	6) Dithane (controls downy mildew)	20.00	ml/ha	2.00	40
	Sub-total				80,138
C	Irrigation Costs				
(1)	River Diversion Weir				
	1) Maintenance costs		MK/ha	228	228
	Sub-total				228
(2)	Water Impounding Dam				
	1) Maintenance costs		MK/ha	1,023	1,023
	Sub-total				1,023
(3)	Motorized Pump				
	1) Fuel consumption	207	liters/ha	234.5	48,542
	2) Maintenance costs		MK/ha	727	727
	Sub-total				49,269
	Net Income, River Diversion Weir A-(B+C(1))				**252,134**
	Net Income, Water Impounding Dam A-(B(1)+C(2))				**251,339**
	Net Income Motorized Pump A-(B(1)+C(3))				**203,094**

Notes:

1) Seed price is current market price

2) Mustard farm gate price was identified from Monitoring Reports (middle price among a range of prices was selected)

3) Mustard yield was obtained from Mlomba EPA minimum potential yield values

4) Fertilizer (S-Compound) price was identified from Chiwoza Field Trip Report of 02/08/08

5) Fertilizer (CAN) price was identified by choosing recent (August 2008) market price on the market.

6) Fuel consumption was based on actual operation at Chiwoza Irrigation Scheme from April to Aug. 2008 for maize planting.

7) Maintenance costs were obtained from Table 3-2 of Technical Guideline. Maintenance includes main facility and canal.

8) Pesticide(Actellic) price was identified by choosing recent (August 2008) market price on the market.

Table A8-5 (7/8) Gross Margin Analysis - Beans

Items for Beans		Dry Season			
		Pump Irrigation			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	1,400	kg/ha	140	196,000
B	Farm Input Costs				
	1) Seed	50	kg/ha	130	6,500
	2) Fertilizer (23:21:0 + 4s)	100	kg/ha	205	20,500
	3) Daconil (controls Anthracnose, angular leafspot)	1.75	kg/ha	2,000	3,500
	4) Carbaryl (controls Stem maggots, beetle)	1.70	kg/ha	1,600	2,720
	5) Dimethoate (controls aphids)	4.25	kg/ha	1,600	6,800
	Sub-total				40,020
C	Irrigation Costs				
(1)	River Diversion Weir				
	1) Maintenance costs		MK/ha	228	228
	Sub-total				228
(2)	Water Impounding Dam				
	1) Maintenance costs		MK/ha	1,023	1,023
	Sub-total				1,023
(3)	Motorized Pump				
	1) Fuel consumption	236	liters/ha	234.5	55,342
	2) Maintenance costs		MK/ha	727	727
	Sub-total				56,069
	Net Income, River Diversion Weir A-(B+C(1))				**155,752**
	Net Income, Water Impounding Dam A-(B(1)+C(2))				**154,957**
	Net Income Motorized Pump A-(B(1)+C(3))				**99,911**

Notes:

1) Seed price was identified from Monitoring Reports of December 2007

2) Farm gate price was fidentified from Monitoring Reports of January 2008

3) Beans yield was identifying from Guide to Agricultural Production Manual

4) Daconil price was identified by choosing recent (August 2008) market price on the market.

5) Carbaryl price was identified by choosing recent (August 2008) market price on the market.

6) Fuel consumption was based on actual operation at Chiwoza Irrigation Scheme from April to Aug. 2008 for maize planting.

7) Maintenance costs were obtained from Table 3-2 of Technical Guideline. Maintenance includes main facility and canal.

Table A8-5 (8/8) Gross Margin Analysis- Irish Potatoes

Items for Irish potato		Dry Season			
		Pump Irrigation			
		Quantity/Unit		Unit Price (MK)	Value (MK)
A	Gross Income	13,889	kg/ha	36.39	505,421
B	Farm Input Costs				
	1) Seed	138	kg/ha	23.89	3,297
	2) Fertilizer (23:21:0 + 4s)	250	kg/ha	205.00	51,250
	3)		kg/ha		0
	Sub-total				54,547
C	Irrigation Costs				
(1)	River Diversion Weir				
	1) Maintenance costs		MK/ha	228	228
	Sub-total				228
(2)	Water Impounding Dam				
	1) Maintenance costs		MK/ha	1,023	1,023
	Sub-total				1,023
(3)	Motorized Pump				
	1) Fuel consumption	290	liters/ha	234.5	68,005
	2) Maintenance costs		MK/ha	727	727
	Sub-total				68,732
	Net Income, River Diversion Weir A-(B+C(1))				**450,646**
	Net Income, Water Impounding Dam A-(B(1)+C(2))				**449,851**
	Net Income Motorized Pump A-(B(1)+C(3))				**382,142**

Notes:

1) Seed price was identified from Averages in Monitoring Reports

2) Farm gate price was fidentified from averages in Monitoring Reports

3) Irish potato yield was identified from averages of monitoring reports and reported farmer's own experience

4) Fertilizer (23:21:0+4s) quantity was identified from practical farmer's own experience from Chaseta Irrigation Scheme

5) Fertilizer (23:21:0+4s) price is prevailing market price as of August 2008.

6) Fuel consumption was based on actual operation at Chiwoza Irrigation Scheme from April to Aug. 2008 for maize planting.

7) Maintenance costs were obtained from Table 3-2 of Technical Guideline. Maintenance includes main facility and canal.

APPENDIX 9

CAMPAIGN PAMPHLET

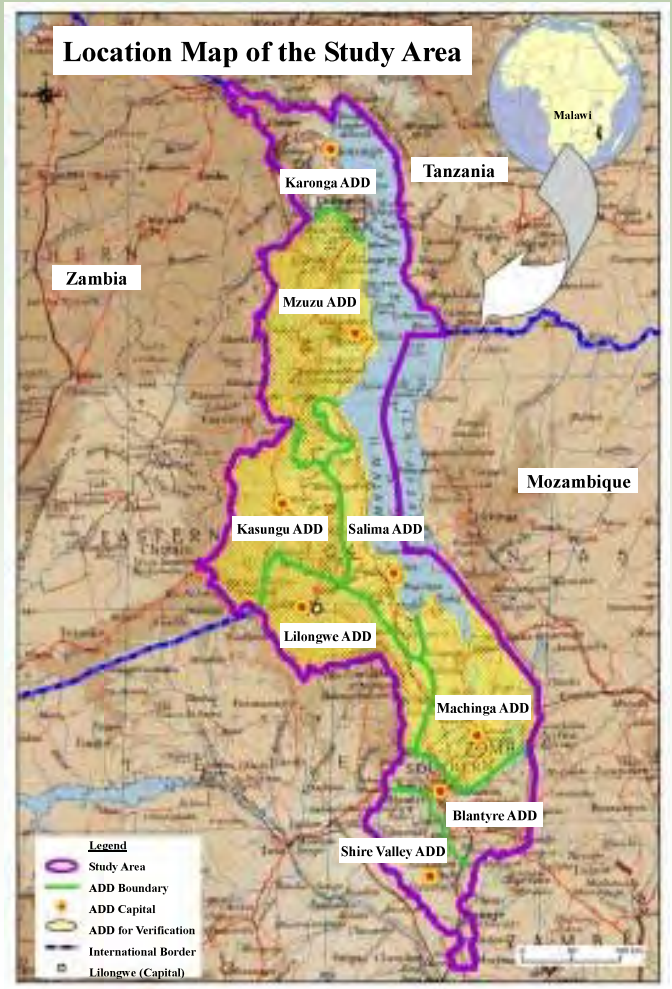
APPENDIX 9 CAMPAIGN PAMPHLET

With supervision of the JICA Malawi office, the Study Team prepared a campaign pamphlet of the Study in March 2007 during the First Field Work, which introduces the brief of the Study including background of the Study, objectives of the Study, overall work schedule of the Study, and the Study Area. The pamphlet was made in both English and Japanese versions.

Target group for the distribution of the pamphlet in Malawi will be the government ministries / agencies both in the central and local levels, donors including other countries, international development cooperation agencies, NGOs and NPOs, as well as private sectors thoset are related to the agriculture and irrigation sectors.

STUDY AREA

The formulation of the Action Plan and Development Plan will be based on a country-wide study and the Verification Project will be carried out at selected model areas in five ADDs of Mzuzu, Kasungu, Salima, Lilongwe, and Machinga.



THE STUDY
ON THE CAPACITY DEVELOPMENT
OF
SMALLHOLDER FARMERS FOR
THE MANAGEMENT OF
SELF-HELP IRRIGATION SCHEMES
(MEDIUM-SCALE)
IN
THE REPUBLIC OF MALAWI

Period: January 2007 - July 2009

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BACKGROUND

Malawi has the population of 12.3 million, 75% of which live in rural area depending on farming for their livelihood. Per capita land holding is below 1 hectare for 75% of the farming households. With rapid population growth currently estimated at 1.9%, further land fragmentation is inevitable hence it is imperative that agricultural productivity must increase at household level to meet the growing demand for food and cash.

Malawi's agriculture largely depends on rainfall which at times is erratic, resulting in drought or floods. Therefore, the proper water resource management is crucial to increase the agricultural productivity of Malawi. At present, only 61,350 hectares, 15% of total irrigable land, is under irrigation, and many existing schemes, especially Medium-Scale schemes, are in poor condition. Thus, there is a need of urgent rehabilitation.

In this connection, the Government of Malawi requested the Government of Japan to conduct a study that can eventually establish a methodology for capacity development of smallholder farmers to rehabilitate and maintain these Medium-Scale Self-Help Irrigation Schemes. In response to this request, the Government of Japan dispatched a Study Team to Malawi in January 2007 to undertake the study.

OBJECTIVES

Overall Goal:

To increase crop production and productivity under Medium-Scale Irrigation Schemes.

Study Purpose:

1) To formulate an Action Plan (A/P) for improvement of existing Medium-Scale Self-Help Irrigation Schemes.
2) To formulate a Development Plan (D/P) in Potential Irrigable Areas for Medium-Scale Self-Help Irrigation Schemes.
3) To develop capacity of Government Staff and farmers in management of Medium-Scale Self-Help Irrigation Schemes.

PRINCIPLES

The principle approach of the Study is to establish low-cost grassroots technology to enhance self-help initiatives in rehabilitation of schemes, proper operation and maintenance of schemes, and improved farm management by farmers.

WORK PLAN

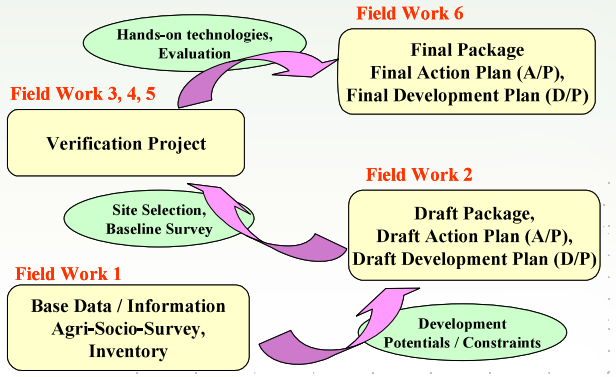
The Work Plan will consist of two steps. The first step will be to formulate an A/P for the improvement of existing schemes, and the second step will be to establish a D/P based on the first step.

Improvement of the existing irrigation schemes will be based on enhanced management skills of farmers through a comprehensive technical package comprising 1) rehabilitation of irrigation facilities, 2) operation and maintenance of facilities including water management of the irrigation system, and 3) farm management improvement.

Overall Schedule:

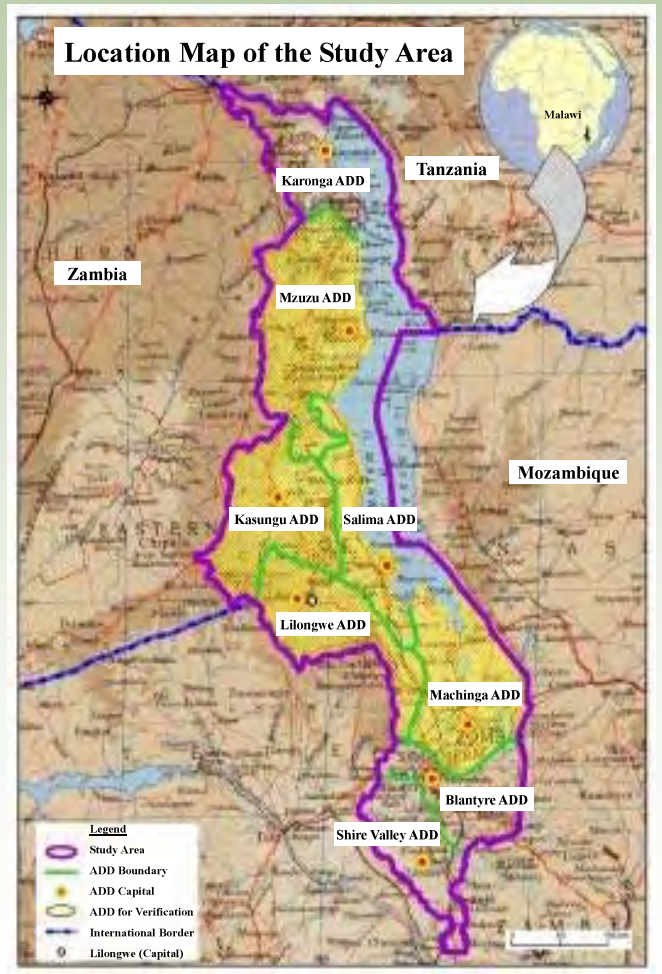
	2007				2008				2009		
	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd
Phase1											
1) Analysis of Current Condition	■										
2) Formulation of Draft Package, Draft A/P & D/P		▬	▬								
Phase2											
1) Survey of Verification Site			▬								
2) Implementation of Verification Project			▬	▬	▬	▬	▬	▬	▬		
3) Evaluation (interim&Final)						△		△			
4) Finalization of Draft Package, Draft A/P&D/P									■		
5) Submmittion of Final Report											△
Field Work	1st	2nd	3rd		4th		5th		6th		
Report	△	△	△	△		△		△			
	Wet S.	Dry S.	Wet S.		Dry S.		Wet S.				

Process to Formulate A/P, D/P and Package:



調査対象地域

本件調査はマラウイ国全土の中規模灌漑施設及びその開発ポテンシャル地域を対象として実施する。なお、実証調査はリロングエADD、カスングADD、サリマADD、ムズズADD、マチンガADDの5ADDで実施する。



マラウイ国
農民組織による（中規模）灌漑施設
管理能力向上計画調査

実施期間：2007年1月から2009年7月迄

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マラウイ国
農民組織による（中規模）灌漑施設
管理能力向上計画調査

背景

マラウイ国全人口12.3百万人の約75%が農村部に居住し、これら農家の75%は所有面積が1ha以下の零細農家である。さらに、1.9%の高い人口増加率と農地の細分化の進展による食糧需要の増大に対処するため、小規模農家レベルにおける農業生産の増加は同国にとって緊急の課題となっている。

マラウイ国の農業は、旱魃と洪水を頻繁に引き起こす不規則な降雨に依存しているため、農業生産の増加には不安定な水資源の適正な管理と利用が必須である。灌漑分野の現状を見ると、現在の灌漑面積は僅か61,350ha(全灌漑可能面積の15%)に過ぎない。しかも、これらの既存灌漑施設のうち、特に小規模農家が管理する中規模灌漑施設は管理・運営状況が悪く、その多くが早急な修復を必要としている。

そのような状況の中、マラウイ国政府は我が国に対し、同国における全国の中規模灌漑施設を有する自助努力灌漑地区について、「農民の灌漑施設修復・運営・維持管理能力強化」を目的として本件開発調査を要請した。同要請に対し、国際協力機構(Japan International Cooperation Agency; JICA)は2007年1月に調査団をマラウイ国に派遣し本件調査を実施することとなった。

目的

全体目標:
マラウイ国全土における既存・新規地区を含めた中規模灌漑施設の改善を通じて、農業生産性の向上を図る。

調査の目的:

1) 既存の中規模灌漑施設において、灌漑施設の修復・運営・管理の改善のための方策(アクションプラン:A/P)を確立する。
2) 未灌漑農地における中規模灌漑開発ポテンシャル(デベロップメントプラン:D/P)を確立する。
3) 実証調査の実施を通じて、灌漑分野に係る政府職員及び農民の中規模灌漑施設修復・運営・維持管理能力を開発する。

基本方針

本調査において2015年を計画目標年とする開発計画を作成しマラウイ国に提言する。

また、本調査実施の基本方針は、入手可能な必要最小限の資材投入、草の根技術の活用と普及、小規模農家の自助努力による灌漑施設の修復・運営・維持管理の促進、ならびに営農技術の改善である。

調査の工程

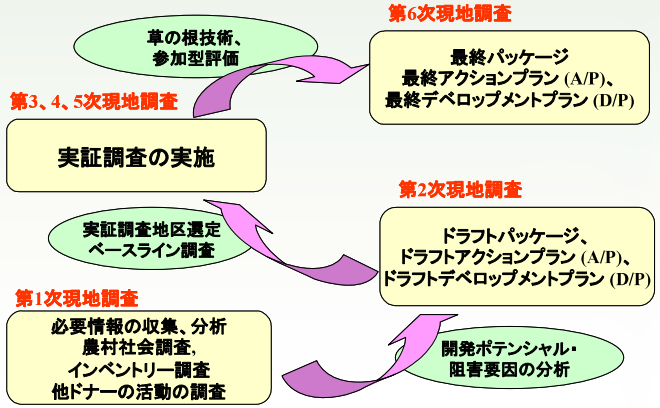
本調査の工程は2段階に分かれる。第1に既存灌漑地区改善のための修復計画(アクションプラン:A/P)の策定を行い、第2にその過程で得た成果を基に新規灌漑地区の開発計画(デベロップメントプラン:D/P)を確立する。そして本調査の実施では、早急な修復を必要としている既存灌漑地区の修復・改善が第1の優先課題である。

また、既存灌漑地区改善の指標となる包括的技術パッケージを、1)灌漑施設の修復手法、2)施設運営・管理及び水管理手法、3)営農改善手法、の3つの技術手法を中核として確立する。

調査のスケジュール

	2007				2008				2009		
	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd
フェーズ1											
1) 現況の調査、分析	■										
2) ドラフトパッケージ、ドラフトA/P、D/Pの策定		■	■								
フェーズ2											
1) ベースライン調査			■								
2) 実証調査の実施			■	■	■	■	■	■	■		
3) 実証調査の評価(中間、最終)						▲		▲			
4) 最終パッケージ、最終A/P、D/Pの策定								■			
5) ファイナルレポートの提出											▲
現地調査	1st	2nd	3rd		4th		5th			6th	
レポート	▲	▲	▲▲		▲		▲				
	雨季	乾季	雨季		乾季		雨季				

技術パッケージ、A/P、D/P策定のプロセス



APPENDIX 10

SURVEY FORMS

APPENDIX 10 SURVEY FORMS

Contents

Table A10-1

Survey Forms for
Agricultural and Rural Development Potential and Constraints

1. Governmental Organizations and Development Framework

Table 1	Nos. of staff, budget and expenditure of RDP (District) for irrigation development of smallholder farmers
Table 2	Number of extension staff and equipment by District, 2005/06
Table 3	Local administrative division from TA to village
Table 4	District development plan and its progress as of 2006

2. Natural Conditions

Table 5	Monthly Rainfall (1996-2005)
Table 6	Average Monthly Maximum, Minimum and Mean Temperature (1996-2005)

3. Socio-Economic Conditions

Table 7	Population and density
Table 8	Population by religion, literacy rate and mortality rate 1998 census year
Table 9	Number of households and average family size by sex, 1998 census year
Table 10	Population aged 5 years and over by highest education level attended and sex, 1998 census year
Table 11	Labour force participation, employment rate, unemployment rate among males and females, 2005
Table 12	Percentage distribution of currently employed persons by type of employment, 2005
Table 13	Household Economy, deficiency of food and poverty headcount (2005)

4. Agricultural Production and Farming

Table 14	Land use by District
Table 15	Cultivated area by type of ownership and District, 2005/06

5. Inquiry on Development Potential and Constraints

Table A10-2 Survey Form for Related Other Donors' Activitty Survey

			ID No.
1	Donor's Name		
2	Name of Irrigation Scheme		
3	Year Built/Proposed	Built Year	Proposed
4	Type of Scheme	River diversion / Impounding Dam / Motorised Pump / Treadle Pump / Inland canal	
5	Location	Region ,District ,ADD ,DADO ,EPA , Section ,	
6	Supporting Period	from to	
7	Donor's Budgets	Spent MK	Future budgets MK (years)
8	Donor's Expert	Experts (Irrigation / Agronomy / Institution / O&M / Marketing / Post Harvest and Marketing	
9	Participation of Farmers	Labor / Material Supply ( ) / Cost-sharing (KM/hh)	
10	Employment of Contractors /Consultants	Yes (Civil work contractors, Consultants (Engineering, Agronomy, Institution)) / No	
11	Supporting Activities	Organization setup and strengthening / Facility construction and rehabilitation ( ) / Farming Technology ( ) / Water management / Post harvesting and marketing ( ) / O&M /Credit services / Gender / Technical Training ( ) / Others ( )	
12	Related Agencies	DOI/ADD/DADO/EPA/WUA	
13	Outline of Scheme	Area	Potential ha Irrigated ha
		Crops	Maize/Potato/Sweet Potato/Beans/Vegetable /Others
		Cropping intensity	Wet season % Dry season %
		Production of major crops (Crop :)	Proposed ton Existing ton
		Yield of major crops	Proposed t/ha Existing t/ha
		Members of WUA	Proposed hh Existing hh
14	Project Effect	Increase of farmer's annual income (KM/hh) / Enhancement of solidarity / Improvement of living conditions	
15	Facility Rehabilitation, Management and O&M Works	Well managed/Fair/No well managed (Reasons: Week organization / No willingness of farmers and groups / No budgets / Others ( )	
16	Lessons Learnt through the Support	Farmer Side 1 2	
		DADO/EPA Side 1 2	
17	Major Problems Encountered	Farmer Side 1 2	
		DADO/EPA Side 1 2	
18	Countermeasures to Solve the Problems	Farmer Side 1 2	
		DADO/EPA Side 1 2	
19	Future Plan		

Table A10-3 Inventory Survey Form for Existing Medium-Scale Irrigation Schemes

General No. _____

1	Name of site	
2	Year built	
3	Operational or not	Operational / Partially operational / Not operational
4	Present irrigated area	(Wet season) _____ ha (Dry season) _____ ha
5	Potential area	(Wet season) _____ ha (Dry season) _____ ha
6	Reasons of area reduction	Facility damages(Intake Structure, Canals, Structures) / Water shortage/Poor operation
7	Fund source	Malawi government / Government bank / Commercial bank / NGO / Self fund / Foreign government / International bank / Others /Unknown
	(Specify the name)	
8	Farmer's Needs	Expansion / Improvement / Rehabilitation / None / Others:

Location

9	Location	(Region) North / Central / South (District) _____
	(ADD)	_____ (DADO) _____
	(EPA)(Section)	_____ (Village) _____ umber of Village) _____
10	Nearest town	_____ km _____ from _____
11	Altitude	_____ m (Longitude) _____ (Latitude) _____
12	Map serial no. 1:50,000	_____ - _____

Water Source

13	Source of water	River / Stream / Impounding dam / Spring / Groundwater / Malawe Lake
14	Name of river / dam / dambo	
15	River flow	Perennial / Seasonal (Flow month) _____ - _____
16	Width of river	_____ m
17	Quantity of water	No data / _____ m3/sec in _____ (Wet month)
		_____ m3/sec in _____ (Dry month)
18	Water right	Registered / Not registered / Not necessary

Natural Condition

19	Topography (macro)	Highland / Lowland / Valley / Dambo
20	Topography (micro)	Flat / Hilly / Undulating / Sloping
21	Vegetation	Farmland / Grassland / Savanna / Woodland / Rainforest / Shrub / Marsh
22	Annual rainfall	Low < 1,000mm / Medium 1,000 - 1,600mm / High > 1,600mm (mm)
23	Flood annually occurred	Yes / No (Flooding month) _____
24	Soil	Clay / Silt / Silty clay / Clay loam / Sandy loam / Fine sand / Sand / Stony
25	Soil fertility	High / Fair / Poor
26	Drainage outlet	Good / Fair / Poor

Access Roads to the Site

27	Road category	Main / Secondary / Village / Private / Footpath
28	Road condition	Good / Fair / Poor All-weather / Impassable when rains
29	Road surface	Earth / Gravel / Stone / Concrete / Asphalt
30	Improvement need	Yes (minor / major / need bridge / need new road) / None

Water Users Association / Farmers Group

31	Exist or not	Yes (formal / informal) / None
32	Year established	
33	Name of association	
34	Number of members	Original : hh Present : hh
35	Ave. land holding	ha / farmer
36	Activity conditions	High / Fair / Poor

Crops / Fruits / Trees / Pasture

37 Wet season crops

Name of crops (irrigated)	Seeding month	Harvest month	Yield (ton/ha)

38 Dry season crops

Name of crops (irrigated)	Seeding month	Harvest month	Yield (ton/ha)

39 Use of draft animal — Fully / Partially / No Use

40 Major market outlet

Crop — Middlemen / Local Market / Group Selling

Fruit — Middlemen / Local Market / Group Selling

Livestock — Middlemen / Local Market / Group Selling

Existing Irrigation Schemes and Facilities

41 Type of scheme — River diversion / Impounding dam / Motorised pumps / Treadle pump / Inland canals

42 Water delivery — Open canal (m) / Pipeline (m) / Groundwater recharge

43 Dimensions of Facilites

Diversions — Width(m)/Height (m)
Material (Masonry, Concrete, Brush dam)

Canals — Width(m) / Depth (m) / Length (m) /

Pipelines — Diameter (cm)/Length (m)/Material (PVC, Steel, Polyethlene)

Dam — Length (m) / Height (m) / Embankement Material (Earth, Concrete) / Spillway

Pumps — Suction dia. (cm) / Discharge dia (cm) / Power (electric : kw, diesel : Hp) / Discharge capacity (m^3/min) /Pump head (m)

44 Facility conditions

Facilities	0riginal	Present	Grade of Damages (%)
Diversions			
Canals			
Pipelines			
Dams			
Pumps			
Splinkler			
Others			

45 Major structures to be rehabilitated and their Costs

46 Exist of Drawings

Layout Map — Exist / No Exist / where to find (ADD, DADO, EPA)

Structure Drawings — Exist / No Exist / where to find (ADD, DADO, EPA)

Table A10-4 Inventory Survey Form

for Smallholder Mediuml-Scale Irrigation Project - Potential Sites

1 Name of scheme _____ **Sheet No.** _____
2 Category Existing scheme / Proposed new scheme

Location:

3 Name of ADD: _____ T/A: _____
4 District: _____ V.H.M _____
5 EPA: _____ Village: _____

Irrigation Scheme:

6 Intake steucture Brush dam / Sand bags / Masonry weir / Impounding dam / Earth dam
Motorised pump / Treadle pump / Watering can
7 Condition of Structure Good / Not good
8 Need repair of structure Yes // No Name of structure: _____

9 Present irrigated area Summer season _____ ha Winter season _____ ha
10 Proposed irrigation area _____ ha (Should be more than 10 ha)
11 Year started _____

12 Name of irrigation club _____
13 Number of members Total: _____ Male: _____ Female: _____

Water Source

14 Source of water Small stream / River / Earth dam / Spring / Groundwater / Malawi Lake
15 Name of river / dam / lake _____
16 River flow Perennial / Seasonal

Natural Condition

17 Topography Highland / Lowland / Flat plain / Mountain / River / Dambo
18 Flood annualy occurred Yes / No

19 **Access Roads to the Site**
20 Road condition Good / Fair / Poor All-weathered / Impassable in summer
21 Road surface Earth / Gravel / Concrete / Asphalt

Present Cropping

22 Summer season crops

Name of crop	Variety	Start month	Harvest month
1)			
2)			
3)			

23 Winter season crops

Name of crop		Start month	Harvest month
1)			
2)			
3)			
4)			

Data source:

Name of Interviewee: _____

Name of Surveyor: _____
Date of Suevey: _____

Table A10-5 (1/3) Periodic Monitoring Form (for River Diversion Weir)

Sheet No: (Bethani / Titukulane / Bawi / Chibwana) -	

1 Scheme Name: **Mz-11 Bethani** -Mzuzu ADD -Rumphi Dist. / **Kas-47 Titukulane** -Kasungu ADD -Dowa Dist.
(To mark) **Li-21 Bawi** -Lilongwe ADD -Ntcheu Dist. / **Ma-1 Chibwana** - Machinga ADD -Machinga Dist.

2 Date, day & time: 3. Weather: Fine / Cloudy / Raining / Heavy rain
4 Period to cover monitoring: 5. Place of meeting:
6 Name of Attendants of Monitoring Meeting:
1) JICA Monitoring Team:
2) Farmers Committee: Total ( ) = M ( ) + F ( )
3) AEDO / AEDC:
4) IO from DADO:
5) Others:

Items		Condition	Description of condition / problems
1	**Irrigation Facility**		
1.1	Condition of irrigation facility		(If damaged, specify the date and how damaged)
	1) Diversion weir & intake	operational / damaged	
	2) Main canal and turn-outs	operational / damaged	
	3)	operational / damaged	
2	**Operation & Maintenance**		
2.1	Use of irrigation facility		(If used, specify the period and date used)
	1) Diversion weir & intake	used / non-use	
	2) Main canal and turn-outs	used / non-use	
	3)	used / non-use	
2.2	Maintenance work		(If done, specify the date and works done)
	1) Diversion weir & intake	done / none	
	2) Main canal and turn-outs	done / none	
	3)	done / none	
3	**Water Management**		
3.1	Use of water for irrigation		(If used, specify the date, hours and crops used)
	1)	used / non-use	
	2)	used / non-use	
3.2	Water distribution rotation		(If done, specify the rotation done)
	1)	done / none	
	2)	done / none	

Items		Condition	Description of condition / problems
4	**Cropping, Post-harvest & Marketing**		
4.1	Present cropping		(If yes, specify the variety, date of sowing, growing stage, etc.)
	1) Crop-1 (Maize)	yes / none	
	2) Crop-2 ( )	yes / none	
	3) Crop-3 ( )	yes / none	
	4) Crop-4 ( )	yes / none	
	5) Crop-5 ( )	yes / none	
4.2	Farm Inputs		(If yes, specify the name, quantity and crops applied, etc.)
	1) Chemical fertilizer	yes / none	
	2) Organic fertilizer	yes / none	
	3) Chemical pesticide	yes / none	
	4) Organic pesticide	yes / none	
	5) Others	yes / none	
4.3	Harvest		(If yes, specify the yield ton/ha or bag/ha)
	1) Crop-1 (Maize)	yes / not yet due	
	2) Crop-2 ( )	yes / not yet due	
	3) Crop-3 ( )	yes / not yet due	
	4) Crop-4 ( )	yes / not yet due	
4.4	Market / Bender		(If sold, specify the selling price, where sold, etc.)
	1) Crop-1 (Maize)	sold /stocked	
	2) Crop-2 ( )	sold /stocked	
	3) Crop-3 ( )	sold /stocked	
	4) Crop-4 ( )	sold /stocked	
5	**Farmers Group Management**		
5.1	Group meeting	held / not held	(The date held, subjects, attendants, etc,)
6	**Any Other Problems / Comments**		

12 Next Monitoring Meeting date and time: _____

A10-5 (2/3) Periodic Monitoring Form (for Water Impounding Dam)

Sheet No: (Chiwoza Dam) -	

1 Scheme Name: **Kas-46 Chiwoza Dam** -Kasungu ADD -Kasungu Dist.

2 Date, day & time: _____ 3. Weather: Fine / Cloudy / Raining / Heavy rain

4 Period to cover monitoring: _____ 5. Place of meeting: _____

6 Name of Attendants of Monitoring Meeting:

1) JICA Monitoring Team: _____

2) Farmers Committee: Total ( ) = M ( ) + F ( )

3) AEDO / AEDC: _____

4) IO from DADO: _____

5) Others: _____

	Items	Condition	Description of condition / problems
1	**Irrigation Facility**		
1.1	Condition of irrigation facility		(If damaged, specify the date and how damaged)
	1) Earth dam / spillway	operational / damaged	
	2) Gate valve / pipes	operational / damaged	
	3) Motorized pump	operational / damaged	
	4) Canals (right / left)	operational / damaged	
2	**Operation & Maintenance**		
2.1	Use of irrigation facility		(If used, specify the period and date used)
	1) Gate valve / pipes	used / non-use	
	2) Motorized pump	used / non-use	
	3) Canals (right / left)	used / non-use	
2.2	Maintenance work		(If done, specify the date and works done)
	1) Earth dam / spillway	done / none	
	2) Gate valve / pipes / pump	done / none	
	3) Canals (right / left)	done / none	
3	**Water Management**		
3.1	Use of water for irrigation		(If used, specify the date, hours and crops used)
	1) Right bank canal	used / non-use	
	2) Left bank canal	used / non-use	
3.2	Water distribution rotation		(If done, specify the rotation done)
	1) Right bank canal	done / none	
	2) Left bank canal	done / none	

Items		Condition	Description of condition / problems
4	**Cropping, Post-harvest & Marketing**		
4.1	Present cropping		(If yes, specify the variety, date of sowing, growing stage, etc.)
	1) Crop-1 (Maize)	yes / none	
	2) Crop-2 ( )	yes / none	
	3) Crop-3 ( )	yes / none	
	4) Crop-4 ( )	yes / none	
	5) Crop-5 ( )	yes / none	
4.2	Farm Inputs		(If yes, specify the name, quantity and crops applied, etc.)
	1) Chemical fertilizer	yes / none	
	2) Organic fertilizer	yes / none	
	3) Chemical pesticide	yes / none	
	4) Organic pesticide	yes / none	
	5) Others	yes / none	
4.3	Harvest		(If yes, specify the yield ton/ha or bag/ha)
	1) Crop-1 (Maize)	yes / not yet due	
	2) Crop-2 ( )	yes / not yet due	
	3) Crop-3 ( )	yes / not yet due	
	4) Crop-4 ( )	yes / not yet due	
4.4	Market / Bender		(If sold, specify the selling price, where sold, etc.)
	1) Crop-1 (Maize)	sold /stocked	
	2) Crop-2 ( )	sold /stocked	
	3) Crop-3 ( )	sold /stocked	
	4) Crop-4 ( )	sold /stocked	
5	**Farmers Group Management**		
5.1	Group meeting	held / not held	(The date held, subjects, attendants, etc,)
6	**Any Other Problems / Comments**		

12 Next Monitoring Meeting date and time: _____

A10-5 (3/3) Periodic Monitoring Form (for Motorized Pump)

Sheet No: (Mantha / Kachere / Chaseta) -	

1 Scheme Name: **(Mz-4 Mantha** -Mzuzu ADD -Mzimba Dist. / **Kas-40 Kachere** -Kasungu ADD -Kasung Dist.)
(To maek) **(Li-2 Chaseta** -Lilongwe ADD -Lilongwe Dist.)

2 Date, day & time: 3. Weather: Fine / Cloudy / Raining / Heavy rain
4 Period to cover monitoring: 5. Place of meeting:
6 Name of Attendants of Monitoring Meeting:
1) JICA Monitoring Team:
2) Farmers Committee: Total ( ) = M ( ) + F ( )
3) AEDO / AEDC:
4) IO from DADO:
5) Others:

	Items	Condition	Description of condition / problems
1	**Irrigation Facility**		
1.1	Condition of irrigation facility		(If damaged, specify the date and how damaged)
	1) Motorized pump & suction	operational / damaged	
	2) Delivery pipes	operational / damaged	
	3) Open canals & turn-outs	operational / damaged	
2	**Operation & Maintenance**		
2.1	Use of irrigation facility		(If used, specify the date & hours operated, lit of diesel used)
	1) Motorized pump (s)	used / non-use	
	2)	used / non-use	
2.2	Maintenance work		(If done, specify the date and works done)
	1) Motorized pump (s)	done / none	
	2) Open canals	done / none	
	3)		
3	**Water Management**		
3.1	Use of water for irrigation		(If used, specify the date, hours and crops used)
	1)	used / non-use	
	2)	used / non-use	
3.2	Water distribution rotation		(If done, specify the rotation done)
	1)	done / none	
	2)	done / none	

Items		Condition	Description of condition / problems
4	**Cropping, Post-harvest & Marketing**		
4.1	Present cropping		(If yes, specify the variety, date of sowing, growing stage, etc.)
	1) Crop-1 (Maize)	yes / none	
	2) Crop-2 ( )	yes / none	
	3) Crop-3 ( )	yes / none	
	4) Crop-4 ( )	yes / none	
	5) Crop-5 ( )	yes / none	
4.2	Farm Inputs		(If yes, specify the name, quantity and crops applied, etc.)
	1) Chemical fertilizer	yes / none	
	2) Organic fertilizer	yes / none	
	3) Chemical pesticide	yes / none	
	4) Organic pesticide	yes / none	
	5) Others	yes / none	
4.3	Harvest		(If yes, specify the yield ton/ha or bag/ha)
	1) Crop-1 (Maize)	yes / not yet due	
	2) Crop-2 ( )	yes / not yet due	
	3) Crop-3 ( )	yes / not yet due	
	4) Crop-4 ( )	yes / not yet due	
4.4	Market / Bender		(If sold, specify the selling price, where sold, etc.)
	1) Crop-1 (Maize)	sold / not yet	
	2) Crop-2 ( )	sold / not yet	
	3) Crop-3 ( )	sold / not yet	
	4) Crop-4 ( )	sold / not yet	
5	**Farmers Group Management**		
5.1	Group meeting	held / not held	(The date held, subjects, attendants, etc,)
6	**Any Other Problems / Comments**		

12 Next Monitoring Meeting date and time: _____

Table A10-6 Questionnaire for Farmers' Satisfaction Survey

No:

Name: Male / Female Date:

Irrigation Site:

1	**Questions about rehabilitation work of irrigation facility.**	Answers (Please circle)
1-1.	Did you participate in rehabilitation work of irrigation facility?	1. Yes 2. No
1-2.	Are you satisfied with the degree of completeness of rehabilitation work? (If not satisfied, please write the reason below.)	1. Satisfied 2. Fair 3. Not satisfied
	Reasons:	
2	**Questions about dry season cropping.**	Answers (Please circle)
2-1.	Did you participate in dry season cropping in the scheme in 2008? (If answer is Yes, please proceed to questions 2-2 and 2-3.)	1. Yes 2. No
2-2.	Are you satisfied with the yield of dry season cropping comparing with after-rehabilitation and before-rehabilitation?	1. Satisfied 2. Fair 3. Not satisfied
2-3.	Do you think your income from dry season cropping has been increased because of irrigation?	1. Yes 2. No 3. I don't know
2-4.	Do you want to participate in next dry season copping using irrigation facility? (If No or Don't know, please write the reasons below)	1. Yes 2. No 3. I don't know
	Reasons:	
3	**Questions about organic fertilizer.**	Answers (Please circle)
3-1.	Did you participate in the training session of Windrow Compost, Liquid Manure, Liquid Bocashi Pesticide? (Please circle what you participated.)	1. Windrow Compost 2. Liquid Manure 3. Liquid Bocashi Pesticide 4. None
3-2.	Are you satisfied with the effect of Windrow Compost?	1. Satisfied 2. Fair 3. Not satisfied 4. I don’t know
3-3.	Are you satisfied with the effect of Liquid Manure?	1. Satisfied 2. Fair 3. Not satisfied 4. I don’t know
3-4.	Are you satisfied with the effect of Liquid Bocashi Pesticide?	1. Satisfied 2. Fair 3. Not satisfied 4. I don’t know
3-5.	Which organic fertilizer do you want to make in next cropping? (Please circle all items applied)	1. Windrow Compost 2. Liquid Manure 3. Liquid Bocashi Pesticide 4. None

APPENDIX 11

FARMER WORKSHOPS FOR EVALUATION

APPENDIX 11 FARMER WORKSHOPS FOR EVALUATION

Contents

Table A11-1 Result of SWOT Analysis for 2007/08 Wet Season Cropping in Farmer Workshops

Site	Strengths	Weaknesses	Opportunities	Threats
Mz-21 Bethani	1. Have a lot of water for irrigation which enables them to cultivate three times a year 2. Availability of organizations that assist with training and equipment 3. Availability of strong agricultural extension services 4. Have fertile soils 5. Have enough equipment for their irrigation farming e.g. shovels, wheel barrows, hoes.	1. Backbiting among members of the scheme discouraging some members to participate actively 2. Lack of cooperation among members of the scheme 3. Weak leadership from committees 4. Lack of schedule for irrigation 5. Disrespect of the constitution governing the operations of the scheme	1. Perennial river and good vegetation at the catchments area 2. Have a good market for scheme produce 3. Availability of organizations that assist with training, equipment, fertilizer an money e.g. government's public works programs 4. Availability of local expertise in areas like construction, carpentry that assist in scheme maintenance	1. Poor road infrastructure which makes marketing difficult during summer seasons. 2. Theft in the scheme by people surrounding the scheme 3. Destruction of crops by monkeys and livestock 4. Soil erosion due to heavy rainfall 5. Do not have input markets in the area e.g. fertilizer markets
Kas-46 Chiwoza	1. Have strong leadership 2. Have a lot of water for irrigation 3. Have vast land which can be cultivated 4. Have several modes of irrigation at their disposal (gravity, engine pump and Treadle pump) 5. Assistance from several organizations in terms of training and equipment	1. The soils in the scheme are mostly sandy which make irrigation through canals difficult due to excessive seepage. 2. Inability to acquire adequate inputs due to their high cost e.g. seed, fertilizer and pesticides 3. Inadequate availability of irrigation equipment e.g. pipes and ropes for treadle pump 4. Poor timing for planting crops 5. Silting of the dam exacerbated by cultivation in the upstream	1. Unity among chiefs which facilitates the running of the scheme 2. Availability of market for our scheme produce 3. Availability of different organizations that offer assistance in terms of training and equipment 4. Availability of local expertise in areas like construction 5. Have reliable source of water for irrigation (dam)	1. Poor road infrastructure which makes marketing of produce difficult in certain times of the year 2. Lack of reliable and profitable markets 3. Destruction of crops by livestock 4. Fishing which dirtens water in the dam and makes irrigation difficult since the gate valve and water sieve get blocked 5. Theft in the scheme by people surrounding the scheme

Site	Strengths	Weaknesses	Opportunities	Threats
Mz-4 Mantha	1. Have water through out the year for irrigation 2. Have good and enough land for cultivation 3. Have good leadership 4. Have a functional and powerful pump for irrigation	1. Do not contribute enough money for buying fuel 2. Scramble for leadership 3. Low yields due to poor soil fertility 4. Some members do not participate actively in the scheme activities 5. Effects of the HIV/AIDS pandemic 6. Plastic pipes in gullies	1. Have reliable markets for our scheme produce at Jenda, Nkhamenya, Majena & Luwelezi 2. Have reliable extension services from GoM & JICA 3. The scheme is close to a road to the market which	1. Theft of produce in the scheme 2. High agricultural input prices 3. Poor road condition in the rain season (slippery and rough) 4. Community members who discourage farmers in the scheme on

		which break due to the heat from the sun	facilitates transportation of produce 4. Have cows for cultivation which eases labour problems 5. Have plenty labour which can be hired 6. Have plenty manure from cattle	irrigation farming 5. Low agricultural output prices at certain times 6. Lack of markets where we can sell on contract for better prices and continuity
Kas-40 Kachere	1. Have enough water for irrigation through out the year 2. The scheme has vast land for cultivation, good and fertile soils 3. Have two pumps for irrigating 4. Have strong leadership 5. Have canals that have eased irrigation	6. Problems of Members of the scheme to contribute money etc. for operations of the scheme 7. Farmers' sufficient knowledge in storage of scheme produce 8. Failure to contribute enough funds for purchase of inputs like fertilizer, seed. 9. Lack of reliable markets where scheme produce can be sold in bulk and at good prices 10. Some members do not have food and therefore do not have time to participate actively in scheme activities as they spend time doing piece works	6. Have good roads that facilitate marketing of scheme produce 7. Have a market near our scheme 8. There is unity among people in the area such that there is no theft or destruction of crops by livestock 9. There are strong extension services 10. Have a lot of ox-carts for ferrying produce and manure	1. There are no reliable markets for our scheme produce 2. The area has no markets where we can buy inputs for our production e.g. seed, fertilizer, diesel etc. 3. Low selling prices for our produce 4. Discouragement from people in the area who say that irrigation farming is not profitable
Li-2 Chaseta	1. 1. Have vast land with fertile soils for cultivation 2. Have a perennial river (Diamphwi) which supplies water through out the year for irrigation 3. Have strong leadership and extension services 4. Have hardworking chiefs within the scheme which encourages other members to work hard as well 5. Have an engine for irrigation	1. Inability to contribute enough money for the purchase of fuel for running the engine 2. Failure to buy fertilizer, seed etc. due their high prices 3. Laziness among some members who fail to participate actively in scheme activities like money contributions for buying inputs for the scheme 4. Prevalence of HIV/AIDS which is negatively impacting of the scheme operations 5. Inadequate plastic pipes (4 needed) for the engine 6. Disregard of the constitution by some members	1. Have a market for scheme produce at Mitundu 2. Have good roads that reach the scheme 3. Scheme produce is not destroyed by livestock because of unity in the area 4. There are strong extension services from JICA and the government	1. Jealous among community members because of the success of the scheme 2. Low selling prices for scheme produce offered by vendors 3. Heavy rains lead to erosion which blocks canals 4. Frequent funerals disturb scheme activities 5. Few extension officers for irrigation

Site	Strengths	Weaknesses	Opportunities	Threats
Kas-47 Titukulane	1. Team Work. (Members meet quite often). 2. Have a constitution which governs the scheme	1. Excessive seepages along the 4km earthen canal. 2. Laziness amongst	1. Have a vast area for cultivation 2. Have a number of rivers as sources of	1. Discouragements from surrounding villagers that JICA/Govt will take in charge of the scheme

	3. Have good extension services from the government 4. Do make collective plans on what to grow in the scheme	some people in the scheme 3. Dependency syndrome in some members reflected in the lack of loan repayments 4. Erosion along the canals	water for irrigation 3. Trainings provided by a number of donors in the scheme are important for further development. 4. Availability of skilled labour in the scheme (builders)	2. Lack of soil conservation at the catchments area 3. Problem at gully crossing, threat to irrigation if not sorted out 4. Lack of proper trainings may continue to affect crop production 5. Un-lined 4km canal would decrease potential area for irrigation.
Li-21 Bawi	1. Regular meetings to discuss issues concerning the scheme operational and maintenances. 2. Seasonal membership fee contributions helps in the smooth running of the scheme 3. Have Sub-committees for various activities in the scheme e.g. water management committee. 4. Have a constitution which is mostly followed in the scheme. 5. Good and strong leadership 6. Ability to follow good extension services provided by the government	1. Greed; some farmers in the upstream do not share water with down-stream members. 2. Lack of respect for the constitution for selected farmers 3. Low farm gate prices. Vendors buy produce at lower prices. 4. Lack of respect for the leadership for selected farmers.	1. Plenty of land for cultivation 2. Perennial river and good vegetation at the catchment area 3. Had an opportunity to learn skills on weir construction from JICA. Knowledge obtained is a treasure for the scheme. 4. Construction and maintenance tools provided by JICA, for further development in the scheme 5. Easy accessibility to market because of the all season (tarmac) road	1. Theft in the scheme by people surrounding the scheme 2. Climate change; early recessions of rains in 2007/08 summer season, a potential threat to farmers who lack knowledge in water management (scheduling). 3. High prices of farm implements 4. Discouragements from surrounding villages that JICA/Govt will take in charge of the scheme 5. Destruction of crops by monkeys and livestock 6. Have unlined canals which are at risk if there are heavy rains
Ma-1 Chibwana	1. Have a team spirit that exists amongst the committee members. 2. Have a constitution 3. Normally have winter/summer action plan meetings	1. Poor Financial Management 2. Failure to maintain secondary canals 3. Failure to follow the action plan by few farmers in the scheme 4. Failure to follow rotational water distribution system 5. Back-biting	1. Have a perennial river for irrigation 2. Good environment at the catchment area 3. Good soil fertility 4. Have vast land for cultivation	1. Climate changes; persistent floods and prolonged dry spells 2. Recurrent locust infestations, which destroys all the crops 3. Lack of money for Pest and disease control 4. Theft by villagers surrounding the scheme 5. Damages caused by fishermen when passing through the scheme 6. Continuous cultivation along the stream which can exacerbate floods.

Table A11-2 Action Plans of 8 Verification Schemes for 2008 Dry Season Cropping made by Farmers

(1) Action Plan for Bethani Irrigation Scheme

Subject	Crop/ Weaknesses	Activities	Responsible Person(s)	Due Date(s)
Dry Season Cropping	Maize and beans	1. Land preparation and acquisition of seed	V. Nyirongo and S. Nyirongo	10th July 2008
		2. Compost manure making and application	Ms. Hara and Mrs J. Mtete	25th June-15th July 2008
		3. Planting	S. Nyirongo	25th June 2008
		4. Weeding and fertilizer application	O.B. Nyirongo	5th July-26th August 2008
	Tomato	1. Making nurseries	G. Chione	25th June 2008
		2. Planting	L. Mtete	25th July 2008
		3. Crop management (Pesticide spraying, weeding, fertilizer and manure application and harvesting)	C. Gondwe	20th July-15th August 2008
Scheme Management	Weak leadership from committees	Call for fresh elections Training for the new committee	GVH Mbazayawo and M.S. Hara	28th June 2008
	Lack of schedule for irrigation which results in quarrels	Preparation of irrigation schedules for blocks	H. Gondwe	2nd July, 2008
	Lack of cooperation among members of the scheme	Training in group management and leadership	Mrs Hara and S. Nyirongo	8th July 2008
	Soil erosion due to heavy rainfall	Construction of contours and planting vetiver grass	G. Chione and V. Nyirongo	10th July -10th December 2008
	Do not have input markets in the area e.g. fertilizer markets	Organize to attract input markets in the area through chiefs	G.V.H Mbazayawo	20th July, 2008
	1. Theft in the scheme by people surrounding the scheme and destruction of crops by livestock	Call for community meeting to sensitize and wan community members	S. Nyirongo	10th August 2008
	Destruction of crops by monkeys	Hunting and guarding the crop plots	A. Nyirongo	15th August 2008

(2) Action Plan for Mantha Irrigation Scheme

Subject	Type of Crop/ Weaknesses	Activities	Responsible Person (s)	Due Date(s)
Dry Season Cropping	Maize	Land and Seed Preparation	Chikepo Matundu	10th July 2008
		Manure Application		15th July 2008
		Planting		20th July 2008
		Weeding		30Jul-Aug 2008
		Harvesting		October 2008
		Storage		30th Oct 2008
	Irish Potatoes	Land preparation	Chiukepo Matundu	10th July 2008
		Training on planting		10th July 2008
		Planting		15th July 2008
		Weeding		30th July 2008
		Banking		15th Sept 2008
		Harvesting		15th Sept 2008
		Tour		25th Aug 2008
	Beans	Land and Seed Preparation	George	10th July 2008

		Training in planting	Matundu	15th July 2008
		Planting		20th July 2008
		Weeding		30th July 2008
		Harvesting and Marketing		10th Sept 2008
	Garlic	Land and Seed Preparation	George Matundu	10th July 2008
		Planting Training		15th July 2008
		Nursery Preparation		15th July 2008
		Transplanting		15th Aug 2008
		Weeding		30th Aug 2008
		Harvesting and marketing		15th Nov 2008
		Tour		25th Aug 2008
Scheme Management	Plastic pipes in gullies which break because of heat from the sun	Replacement with aluminium pipes	Chiukepo Matundu	11th Jul 2008
	Theft of scheme produce	Will convene meetings to sensitize community members on importance of the scheme	Village Headman-Nthazama	4th Jul 2008
	High cost of agricultural inputs	Applying a lot of manure Planting composite seeds which can be recycled three times	Anthony Mwale	30th Jul 2008
	Discouragement from community members	Will convene meeting to sensitize and remind members of the importance and goal of the scheme	Esau Matundu (Village headman)	4th Jul 2008
	Low agricultural output prices at certain times in the year	Strategic planting of crops to coincide with periods of low supply	Thobwa	5th Sept 2008
	Lack of reliable markets where we can sell on contract and at good prices	Training in market research	Chisisi, AEDC, DADO	15th Jul 2008
	Inadequate funds to buy fuel for the pump	Will increase financial contributions from MK500-MK700	H.E Matundu	20th July 2008
	Scramble for leadership	Leadership training	J. Matundu	7th July 2008
	Low yields due to poor soil fertility	Training in manure making	Mercy Musi	30th June 2008
		Making manure		30th July 2008
		Manure application		30th July 2008
	Some members are inactive in scheme activities	Will call for meetings to remind one another of the rules and regulations and encourage one another	Esau Matundu (village headman)	4th July 2008
	HIV/AIDS pandemic	Call for sensitization meetings, prevention, mitigation and Voluntary Counselling and Testing (VCT)	Mercent Nkhambule and Health officer	15th July 2008

(3) Action Plan for Chiwoza Irrigation Scheme

Subject	Type of Crop/ Weaknesses	Activities	Responsible Person	Due Date(s)
Dry Season Cropping	Maize	Land preparation	Clement Zimba	2nd July 2008
		Planting		9th July, 2008
		Fertilizer application		9th July, 2008
	Paprika	Land preparation	Frank Phiri	20th June 2008
		Planting		30th June 2008
		Fertilizer & manure application		4th July 2008
	Tomatoes	Land preparation	Henock Binga	1st July 2008
		Planting		2nd Aug. 2008
		Fertilizer & manure application		9th Aug. 2008
	Cabbage	Land preparation	Flatera Chiumia	20th June 2008
		Planting		22nd July, 2008

		Fertilizer & manure application		29th July 2008
	Sweet potatoes	Land preparation planting	Silvester Banda	28th July 2008 6th Aug. 2008
Scheme Management	The soils in the scheme are mostly sandy which make irrigation through canals difficult due to excessive seepage	1. Manure making and application 2. Lining of tertiary canals with clay soil	Gift Muyayi	3rd July, 2008
	Inability to acquire adequate inputs due to high costs e.g. seed, fertilizer and pesticides	1. Buying inputs in groups 2. Manure making & application. Use of botanical pesticides, liquid bocash and delia	Frank Phiri	3rd July, 2008
	Inadequate availability of irrigation equipment e.g. pipes and ropes for treadle pump	Will have a group plot whose proceeds would help buy the equipment	Frank Phiri	1st October 2008-2009
	Poor timing for planting crops	Calling for a meeting in the scheme to address the problem	W.Msunje	28th June 2008
	Lack of reliable and profitable markets	1. Formation of a cooperative 2. Training in marketing principles and market research	Y. Mtoso	5th October 2008-2009
	Destruction of crops by livestock	Calling for a community meeting to sort out the problem	Adam Chimombo	5th July 2008
	Fishing which dirtens water in the dam and makes irrigation difficult since the gate valve and water sieve get blocked	Calling for a community meeting to sort out the problem	Adam Chimombo	5th July 2008
	Theft in the scheme by people surrounding the scheme	Calling for a community meeting to sort out the problem	Hendwel Nkhata	5th July 2008
	Silting of the dam	Dredging of the dam	Grace Zimba	10th July 2008

(4) Action Plan for Kachere Irrigation Scheme

Subject	Crop/ Weaknesses	Activities	Responsible Person(s)	Due Date(s)
Dry Season Cropping	Maize	1. Land preparation	Lesford Phiri	25th July, 2008
		2. Planting	Lesford Phiri	10th August, 2008
		3. Watering	Njovu Mwale and Mercy Moyo	10th August-7th November 2008
		4. Harvesting	Jasten Samson & Ephrina Phiri	20th November 2008
	Tomato	1. Land preparation	Faison Mwale	25th July, 2008
		2. Planting	Faison Mwale	28th July, 2008
		3. Watering	Estere Phiri	28th July-15th October 2008
		4. Harvesting	Faison Mwale & Estere Phiri	15th October 2008
Scheme Management	Problems of Members of the scheme to contribute money e.t.c for operations of the scheme	Will mobilize scheme members to contribute money and later find organizations that can assist with funding	Henry Phiri	27th July, 2008
	Farmers do not have sufficient knowledge in storage of scheme produce	Will call for training in management/storage of produce	Lozina Mwale	17th October, 2008
	Failure to contribute enough funds for purchase of inputs like fertilizer, seed.	Will organise meetings to mobilize scheme members to contribute and also sensitize them on the importance of the scheme	Cosmas Banda	27th July, 2008

	Lack of reliable markets where scheme produce can be sold in bulk and at good prices	Will embark on market research to find reliable and profitable markets	S.T.A Chambwe and W. Goliati	28th September, 2008
	There are no reliable markets for our scheme produce	Training in market research	Christopher Banda	15th July, 2008
	The area has no markets where we can buy inputs for our production e.g. seed, fertilizer, diesel	Will request traders/trading companies to open agricultural input shops in the area	Lesford Phiri	5th July, 2008
	Low selling prices for our produce	Planting crops at the strategic times so that harvesting coincides with times of low supply	Eliza Phiri	7th August 2008
	Discouragement from people in the area who say that irrigation farming is not profitable	Call for meetings to sensitize members from the surrounding communities about the importance of irrigation farming	Mr M.D. Bwankhu	10th July, 2008

(5) Action Plan for Titukulane Irrigation Scheme

Subject	Type of Crop/ Weaknesses	Activities	Responsible Person (s)	Due Date(s)
Dry Season Cropping	Maize	Planting	Chairman (Mr. Goliati)	15th July 2008
	Irish Potatoes	Planting	Mr. Tsempha	15th July 2008
	Tomatoes	Planting	Mr. Tsempha	20th August 2008
	Peaches	Planting	Secretary (Mr. Njobvu)	30th August 2008
Scheme Management	Erosion at the intake causing pipe blockages at the intake	Regular sand removals at the intake	Chairman (Mr. Goliati)	Summer Season (Oct-Mar)
	Soil erosion along the gullies, where the canal is seen to have pass through	Planting vertiver grass and bamboos	Chairman (Mr. Goliati)	Summer Season (Oct-Mar)
	Some people refusing to let canal pass through their gardens during some seasons	Calling for a meeting with people whose fields are involved	Village headmen	20th July 2008
	Discouragements from surrounding villages that JICA/Govt will take over the scheme	Calling for a village meeting	Village headmen	20th July 2008
	Low water supply to the scheme caused by failure of water to cross the river crossing	Lining the canal	Chairman (Mr. Goliati)	14th June 2008
		Raising the weir which bags of sand	Committee Member (Lonile)	13th June 2008
	Laziness observed in some scheme members.	Encouragement village meeting to be called by the Village Headmen and the main committee	Village Headmen and the Committee	16th June 2008
	People with hand-out spirit (people who do not want to repay loans)	Calling for a meeting in the village to address the problem	Village Headmen and the Committee	16th June 2008
	Individualism in the selling out of farm produce	Calling for a meeting in the village to form an association	Village Headmen and the Committee	16th June 2008

(6) Action Plan for Chaseta Irrigation Scheme

Subject	Crop/ Weaknesses	Activities	Responsible Person(s)	Due Date(s)
Dry Season Cropping	Maize (DK 8033)	1. Land preparation, application of manure	Chairman	1-5th July, 2008
		2. Planting (Zone 2)	Commiittee and	2nd July, 2008

			Mr Kaunda	
		3. Planting (Zone 3)	Commiittee and Mr Kaunda	3rd July, 2008
		4. Planting (Zone 4)	Commiittee and Mr Kaunda	4th July, 2008
		5. Planting (Zone 5)	Commiittee and Mr Kaunda	5th July 2008
		6. Harvesting	Mr Yembekezani	15th October 2008
Scheme Management	High cost of fuel for the pump	Will raise the finantial contributions (MK200-MK250)	Charles Mbewe and Kaunda	15th July 2008
	Inadequate pipes for connecting to the pump	Will contribute money and buy	Magret and Mr Kaunda	20th July 2008
	HIV/AIDS pandemic	Will call for meetings to discuss prevention methods and how to assist the infected	Mr Nyundo (chief), Mr Kaunda and Health officer (Mr Masina)	10th July, 2008
	Inadequate funds for buying agricultural inputs	Raise the financial contributions for the members	Mr Kaunda	5th July, 2008
	Soil erosion which leads to silting of the canals	Will construct contours and plant vetiver grass	Mr Msiska	2nd November 2008
	Laziness and insubordination in irrigation issues by some members	Will convene meetings to encourage one another and remind each other of the rules and regulations	Mr Kaunda, Mr Msiska and Mr Shumba	5th July 2008
	Jealousy from the community members	Will convene members for sensitization on the importance f irrigation farming	Mr Wesley	20th July 2008
	Low agricultural output prices	Will look for better markets for scheme produce	Mr B. Kanolo	5th September 2008

(7) Action Plan for Bawi Irrigation Scheme

Subject	Crop/ Weaknesses	Activities	Responsible Person(s)	Due Date(s)
Trainings for Dry Season Cropping	Maize Production	1. Setting out and preparation of beds	AEDO and Mrs Symon.	23rd June 2008
		2. Compost manure and fertilizer application	AEDO and Mr. Khomba	2nd Week of July 2008
		3. Crop management		
	Tomato Production	1. Methods of planting	AEDO and Mr. Jana	23rd June 2008
		2. Compost and fertilizer applications	AEDO and Mr. Chintumbira	2nd Week of July 2008
		3. Staking and crop management		
	Cabbage Production	1. Methods of planting 2. Fertiliser application 3. Pest and disease control	AEDO and Mr. Chimbayo	23rd June 2008
	Onion Production	1. Methods of planting 2. Fertiliser application 3. Pest and diseases control	AEDO and Mr. Mangulenje	23rd June 2008
Dry Season Cropping	Maize	Planting	AEDO and Mrs Symon.	23rd June 2008
	Tomato	Planting	AEDO and Mr. Jana	23rd June 2008
	Cabbage	Planting	AEDO and Mr. Chimbayo	23rd June 2008
	Onions	Planting	AEDO and Mr. Mangulenje	23rd June 2008
Scheme Management	Talks that the scheme will be taking by either JICA or govt	Meeting to be organised by the chiefs and committee members with villagers	Chairman (Mr. Alex Juwawo) and Village Headmen	20th June 2008

	Livestock and monkeys which destroy crops	Hunting and killing the monkeys	Mrs. V Zondani and Mr. Simeon	Every year
		Talking with owners of the livestock		4th August
		Safeguarding the fields during days by a committee		Soon after planting the crops
	Theft in the scheme	Establishing a community Police	Mr. Mangulenje	1st July 2008
	Increase in the input prices	Prioritising and encouraging each other to be making and using compost manures	Mrs. Chitenji	21st June 2008
		Farmers' contributing money in groups, towards purchasing of farm inputs		
	Erosion along earthen canals	Planting vetiver grass	Mr. Chimbayo	28th Dec 2008
	Laziness observed in some farmers	Having field days and use of training plots	Chairman (Mr. Alex Juwawo)	15th August 2008

(8) Action Plan for Chibwana Irrigation Scheme

Subject	Crop/ Weaknesses	Activities	Responsible Person(s)	Due Date(s)
Dry Season Cropping	Maize (SC 403 and DK 8031)	Buying seed and Planting	Secretary (J. Phiri) and AEDO (Mr. Chodzadza)	25th July 2008
	Tomato	Planting	Secretary (J. Phiri) & AEDO (Mr. Chodzadza)	25th July 2008
	Beans	Planting	Secretary (J. Phiri) and AEDO (Mr. Chodzadza)	25th July 2008
	Water Melons	Planting	Secretary (J. Phiri) and AEDO (Mr. Chodzadza)	25th July 2008
Scheme Management	Financial Mismanagement	Calling for a meeting and training s on financial management	Chairman (Mr. N. Tapwata)	21st June 2008
		Producing and keeping of financial records	Secretary (Mr. J. Phiri) and Treasurer (Mr. M. Pute)	25th June 2008
		Opening a Bank Account	Chairman (Mr. N. Tapwata)	10th Sept 2008
	Failure to follow water management procedures	Calling for a meeting to discuss and agree on Canal maintenance	Treasurer (Mr. M Pute)	21st June 2008
		Canal maintenances	Chairman (Mr. N. Tapwata)	10th July 2008
	Failure to purchase and grow a recommended variety in the scheme by some members	Calling for a sensitisation meeting on the importance of planting recommended varieties	Secretary (J. Phiri)	21st June 2008
		Having a demonstration plot where the following crops will be planted (Tomatoes, maize, water melons and beans)	AEDO (Mr. Chodzadza) and Mr. J. Phiri	25th July 2008
	Back-biting	Revisiting the constitution	Secretary (J. Phiri)	30th July 2008
		Establishing a discipline committee		
	Pests and disease infestations	Buying chemicals	Treasurer (Mr. M. Pute)	30th June 2008
	Theft in the scheme	Establishing tough rules in the constitution on what to do to such people if found	Village Headman Chibwana and Chairman (Mr. N. Tapwata	30th July 2008

Table A11-3 Result of SWOT Analysis for 2008 Dry Season Cropping in Farmer Workshops

Site	Strengths	Weaknesses	Opportunities	Threats
Mz-11 Bethani	1. They have plenty water which make them plant three times a year. 2. They have hard working extension officers. 3. Have good soils. 4. They get assistance from organisations on inputs and trainings. 5. The use of blocks in the irrigation system.	1. Conflicts between scheme members and farmers surrounding the scheme 2. Steep sloped areas which cause soil erosion. 3. Other scheme members do not understand the rules or the guiding constitution very well. 4. Cracking and destructions of the weir.	1. They receive free trainings. 2. Different organisations visit the scheme and assist them. 3. They do visit other schemes where they learn different things. 4. They are close to the markets. 5. They have different skills among scheme members. 6. They are able to harvest three times.	1. Continued breakings of the scheme structures like canals and the weirs. 2. Soil Erosion. 3. Pest attacks like stock borers. 4. Damaged bridge which lead to their scheme. 5. Opening of an intake by surrounding members of the scheme. 6. Expensiveness of the raw materials/inputs to the scheme operation.
Kas-46 Chiwoza	1. Have plenty land for the farming in the scheme 2. They have water for irrigation. 3. Have access to the irrigation equipments 4. Have several methods of irrigation 5. There have many people with different skills in the scheme. 6. They are able to realise food and money from the scheme. 7. There is good relationship and unity among the village heads.	1. Reduced volumes of water due to siltation. 2. Lack of reliable markets 3. Few water pipes for delivery of water in the scheme 4. Price increases of the irrigation equipment 5. Soil Erosion in the scheme	1. Good Extension services to them. 2. Get assistance from organisations. 3. They are receiving different trainings 4. They receive visitors in the scheme who encourages them. 5. Easily accessible casual labours who work in the scheme.	1. Sacristy of engine fuel (diesel). 2. Damages to the irrigation equipment. 3. Thefts in the scheme 4. Siltation of the dam reservoir. 5. Attacks on the crops by birds 6. Fishermen stir-up water making it muddy and disturb the water delivery system. 7. Continuous breaking of the intake pipe which affects the delivery of water system.

Site	Strengths	Weaknesses	Opportunities	Threats
Mz-4 Mantha	1. Have plenty and good land for farming. 2. They have a powerful irrigation pump. 3. Have annually flowing rivers. 4. Well constructed canal done by JICA.	1. Lack of money to buy fuel for the engine. 2. Laziness among the scheme members. 3. HIV/AIDS pandemic. 4. Leadership struggles. 5. Infertile soils. 6. Little skills in the storage of harvested crops in the scheme. 7. Lack of skills to access good markets	1. Good trainings provided by JICA and the government Extension officers. 2. The scheme is close to the road which connects to the big markets. 3. Plenty of livestock manure (dung) in the area. 4. Have oxen to provide farm power. 5. Easy access of casual labours.	1. Low prices offered on the harvested crops. 2. Discouragements from the surrounding members that irrigation farming is not profitable. 3. Thefts to the crops. 4. Bad roads which are not maintained after the wet season.

Kas-40 Kachere	1. They have plenty water for irrigation and also fertile soils. 2. Have good and strong local leader (ST/A Chambwe) who encourages farmers in farming 3. Have body energy which makes them work hard. 4. Ability to harverst and realise income from sales 5. They have two engines in their scheme	1. Lack of money to some farmers which makes them fail to do farming operations. 2. Lower lined canal which was constructed by JICA. 3. Maintenance of the engine takes too long.	1. Good and accessible road up to the irrigation scheme. 2. They have a mobile market where they sell their produce. 3. Have government and JICA extension workers who provide farming skills and other trainings.	1. Expensiveness of the farming equipments and inputs like hoes, fertilizer, diesel and oil. 2. Hunger which cause other people to steal the crops.
Li-2 Chaseta	1. Good River which supply water annually. 2. Fertile soils which are also conserved. 3. Able to get enough food from the farming	1. Lack of coordination and unity among the members. 2. Too many people than required in the scheme	1. JICA provided them with an irrigation pump. 2. JICA provided trainings on irrigation farming. 3. Readily available markets. 4. Have a place in the scheme with moisture annually.	1. Sicknesses among the members. 2. Thieves 3. Diseases which attack the crops. 4. Livestock attack the crops. 5. Expensiveness of the farming equipments and inputs.

Site	Strengths	Weaknesses	Opportunities	Threats
Kas-47 Titukulane	1. Team Work and unity-members meet quite often and they always work in a group. 2. They encourage each other on the manure making. 3. Have good leadership They get different and many trainings. 4. Access to the input credits from other organisations e.g. Irish potato and peaches. 5. The relationship which has existed with other JICA schemes.	1. Other farmers do not follow the new methods of manure making 2. Pests attacks Other farmers deny borrowing their land to fellow farmers. 3. Poor water circulation and access 4. Improper talking within members of the group and lack of other rules in scheme management. 5. Laziness among the farmers	1. Rehabilitated weir by JICA 2. Have a number of rivers as sources of water for irrigation 3. Trainings provided by JICA and the government Extension agent especially on the manure making. 4. Availability of trees and other plants which conserve the soil fertility like vertiver grass. 5. Frequent visits by the extension agents and other farmers	1. Other village members deliberately block the water intake pipes. 2. Breakings at gully crossing, threat to irrigation. 3. Lack of enough trainings to the farmers 4. Thefts to the crops. 5. Livestock which stamp and break the canals. 6. Soil Erosion in the scheme

Li-21 Bawi	1. They have plenty water for irrigation and also fertile soils. 2. Have good relationship between the farmers and other organisations 3. Received fertilizer from the government and this made them to have cash at the bank. 4. Have a hard working extension agent (AEDO) 5. They usually have trainings on new farming technologies. 6. They constructed other weirs on their own apart from those rehabilitated	1. Poor management and care in the irrigation canals. 2. Absenteeism to the meetings by other farmers. 3. Other farmers do not follow extension advices. 4. Late payments to the scheme loans. 5. Improper care to the irrigation equipments. 6. Not following the rules set by the scheme. 7. No exchange visits to other schemes Scrambling for leadership positions.	1. The river where they are getting water has natural rocks and plants like trees which make annual flow of the water. 2. They have a fertile land 3. Have a reliable market and easily accessible because they are close to the tarmac road which is also the main road.	1. High water demands due to non rehabilitated weirs like 1, 2, 3, 4, 6, 8, 9, 10, 11, 12, 13, and 14. 2. Farmers are refused to use the water by other surrounding villagers 3. Threats from surrounding villages that JICA will take irrigation land from them. 4. Rumours that irrigation degrades the soil fertility. Thieves. 5. Destructions by water to some weir. 6. Pest and disease attacks e.g. wilting and stock borer
Ma-1 Chibwana	1. Have a team spirit and good coordination in the scheme. 2. Have plenty land for the farming in the scheme 3. They are close to the water supply (river). 4. Access to the irrigation equipments	1. Poor circulation flow of the water in the canals because they are not cemented. 2. Backbiting from the surrounding people 3. Thieves who steal their crops	1. The presence of Extension agents (AEDO) who provides extension services to them. 2. JICA provided trainings and irrigation equipments. 3. There are potential buyers to the produce.	1. Price increases of the fertilizer. 2. Insufficient water supply in the dry season. 3. Theft by villagers surrounding the scheme 4. Price fluctuations when they harvest. 5. Pest and disease attacks on the crops.

Table A11-4 Action Plans of 8 Verification Schemes for Strengthening made by Farmers

(1) Action Plan for Bethani Irrigation Scheme

Weaknesses/threats	Activities	Responsible Person (s)	Due Date(s)
1. Conflicts between scheme members and farmers surrounding the scheme over water usages	To discuss with them in a community meeting	V. Nyirongo and IO	9th January 2009
	To acquire water rights		
2. Steep sloped areas which cause soil erosion.	To plant vertiver grass on the areas	A.Mtete and M. Chiumia	10th January 2009
	To use pipes on the highly sloped areas		
3.Other scheme members do not understand the rules or the guiding constitution very well	The new committee will meet and discuss on the implantation of the constitution	S. Nyirongo	29th November 2008
4. Cracking and destructions of the weir and continued breakings of the scheme structures like canals.	To do the maintenance on the weir and using the cement in the maintenance and construction of the canals	J. Chawinga and IO	26th April 2009
	To use bags of sand to raise the weir	S. Nyirongo	12th June 2009
6. Soil Erosion.	To construct the marker ridges	H. Gondwe and C. Mhango	20th December 2008
	To practice the use of manure		
	To construct the box ridges		
7. Pest attacks like stock borers.	To use pesticide like Liquid Bocashi and others	O.B. Nyirongo and L.Mtete	25th June 2009
	To practice early planting method		
8. Damaged bridge which lead to their scheme.	To request assistance from the District agriculture office on the construction of the bridge.	S. Nyirongo and VH Juwiri	9th January 2009
9. Opening of an intake by surrounding members of the scheme.	To discuss with them and acquire water rights	V. Nyirongo	9th January 2009
10. Expensiveness of the raw materials/inputs to the scheme operation.	Proper care of the materials which they have.	H. Gondwe and V. Nyirongo	1st April 2009 and continuous
	Changing from the use of fertilizer to the use of manure.		
Theft in the scheme by people surrounding the scheme and destruction of crops by livestock	Calling for a community meeting to sensitize and warn community members	H. Gondwe and the VH	25th June 2009

(2) Action Plan for Mantha Irrigation Scheme

Weaknesses/Threats	Activities	Responsible Person (s)	Due Date(s)
1. Lack of money to buy fuel for the engine.	Increasing the amount of contribution in the scheme from MK700 to MK1000	Mrs Stella Kachilika	30th April 2009
	To have a group plot where they can sell the harvest from it.		20th December 2008
2. Laziness among the scheme members.	Calling for a meeting and sensitize farmers on the importance of scheme	Mr H.E Matundu	10th December 2008
	Revising the constitution of the scheme		
3. HIV/AIDS pandemic.	Sensitizing the farmers on the dangers and prevention of HIV/AIDS	Mr J. Manotha	30th December 2008
4.Leardership struggles	Having the leadership training	Mr Thobwa	18th December 2008
5. Infertile soils.	Training all farmers on the manure making and the use of manure	Mrs Victoria Jere and Mr Anthony Mwale	15th December 2008
	Construction of the marker ridges		15th March to 30th June 2009

6. Little skills in the storage of harvested crops in the scheme.	Training farmers on application of the pesticide like actellic	Mr. C. Matundu and extension officer	31st May 2009
7. Low prices offered on the harvested crops and lack of skills to access good markets.	Training on how to access the good markets.	Mr George Matundu	15th June 2009
8. Discouragements from the surrounding members that irrigation farming is not profitable.	Encouraging the farmers and making sure of good progress on the farming activities.	Mr H. E Matundu	10th December 2008
10. Thefts to the crops.	Revising the security rules	Mrs E. Gondwe and VH Nthazama	20th April 2009
11. Bad roads which are not maintained after the wet season.	Selling the produce in large amounts and in a group	Mr H. Matundu	10th December 2008

(3) Action Plan for Chiwoza Irrigation Scheme

Weaknesses/threats	**Activities to address the problem**	**Responsible people(s)**	**Due Date(s)**
1. Reduced volumes of water due to siltation.	Desiltation by the farmers to the dam (digging to remove the mud in the dam).	Grace Zimba and A. Kambona	30th January 2009
2.Lack of reliable markets	Training on the market search to be done by the AEDO/AEDC	Mr Muyayi	18th December 2008
	Growing of crops which are highly demanded on the market.		
3. Few water pipes for delivery of water in the scheme	Selling the harvest from the group plot and use the money to buy water pipes	F. Chiumia	30th April 2009
4. Price increases of the irrigation equipment and inputs	Group purchasing of the equipments and inputs	Baziwell Kamanga	27th November 2008 and continuous
	Using the local materials like composite manure and pesticide like Liquid Bocashi		
5. Soil erosion in the scheme	Addition of the contours and planting vetiva grass	S. Banda	1st December 2008
6. Scarcity of fuel (diesel)	To buy and reserve more fuel at the scheme	C. Zimba	10th March 2009
7. Damages to the irrigation equipment like continuous breaking of the intake pipe which affects the delivery of water system	Buying and/or replacing the broken parts or equipments.	F. Chiumia and R. Phiri	29th November 2008 and continuous.
8.Thefts in the scheme	Conducting a meeting and making awareness to the community members.	H. Nkhata, K. Malata and Vg Head Malata	5th December 2008
9. Siltation of the dam reservoir	Desiltation by the farmers to the dam (digging to remove the mud in the dam).	Grace Zimba and A. Kambona	30th January 2009
10. Attacks on the crops by birds	Guarding the crops	H. Nkhata and K. Malata	5th December 2008
11. Fishermen stir-up water making it muddy and disturb the water delivery system.	Conducting a meeting and making awareness to the community members.	H. Nkhata, K. Malata and Vg Head Malata	5th December 2008

(4) Action Plan for Kachere Irrigation Scheme

Weaknesses/threats	**Activities to address the problem**	**Responsible people(s)**	**Due Date(s)**
1.Lack of money to some farmers which makes them fail	Doing piece works and opening a scheme bank account	Sinesha Phiri and H. Phiri	9th December 2008 to 3rd January 2009

to do farming	To have a development sub committee		
2. Lower lined canal which was constructed by JICA.	To construct a canal which can be easily used and utilized	Njobvu Mwale and extension officer	11th May 2009
3. Maintenance of the engine takes too long.	Making sure that all the maintenance works are done immediately and properly	W. Goliati	10th December 2008 and continuous
4. Expensiveness of the farming equipments and inputs like hoes, fertilizer, diesel and oil.	Manure making and application to the field	Sinesha Phiri and Lesford Phiri	7th March 2009
	Doing piece works to earn income		7th March 2009
	Every farmer has to pay MK500		28th December 2008 to 7th May 2009
5. Hunger which cause other people to steal the crops.	Guarding the crops	W. Goliati	10th December 2008 and continuous

(5) Action Plan for Titukulane Irrigation Scheme

Weaknesses/threats	Activities	Responsible Person (s)	Due Date(s)
1. Other farmers do not follow the new methods of manure making	Conducting a field day and train people on the importance of manure	Mr Njobvu and the AEDO	19th November 2008
2. Pests attacks	Guarding, crop rotation and application of pesticides	Farmers, Mr Njobvu	18th November 2008 and continuous
3. Other farmers deny borrowing their land to fellow farmers.	Discussing with them to rent the plots	Mr Njobvu	18th November 2008
4. Poor water circulation and access	Water distribution rotation and strengthening the canals	Committee, Mr G Nyozo and Mr K. Chimcheka	18th November 2008 and continuous
5. Theft to the crops.	Guarding the crops and taking the thieves to police station	Mr B. Chimcheka and V. Headman	18th November 2008 and Continuous
6. Improper talking within members of the group and lack of other rules in scheme management	Election of discipline committee and add important rule in the constitution	Mr G. Nyozo and Mr. S. Kabukonde	30th November 2008
7. Laziness among the farmers	Encouraging them by taking them to other farmers who are prospering.	T. Sakondautsi	28th February 2009
8. Other village members deliberately block the water intake pipes	Discussing with the surrounding villages to discipline the village members.	Village Headman, Mr B. Chimcheka and W. Ngombe	21st December 2008
9. Breakings at gully crossing, threat to irrigation.	Planting bamboos, Vertiver and the Banana trees	Mr A. Njobvu	December 2008-February 2009
10. Lack of enough trainings to the farmers	Arrange with AEDO to have enough trainings and follow them	Mr G. Nyozwe and AEDO	21st November 2008
11. Livestock which stamp and break the canals.	Guarding the crops	Mr A. Njobvu	18th November 2008 and continuous
12. Soil Erosion in the scheme	Construction of contours, planting of vertiver and trees that conserve the moisture	Mr A. Njobvu	December 2008-February 2009

(6) Action Plan for Chaseta Irrigation Scheme

Weaknesses/threats	Activities to address the problem	Responsible people(s)	Due Date(s)
1. Lack of coordination and unity among the members.	Conducting a meeting to bring coordination and unity in the scheme	Mr. Msiska and the Village Head	1st December 2008
	Setting up rules which will work towards making members to coordinate		
2.Expensiveness of the farming equipments and inputs	Encouraging farmers to use manure	Mr Msiska and the extension officer	16th December 2008
	Training farmers on skills on locally made inputs like pesticide and money reserves (keeping money for future use).		
3.Too many people than required in the scheme	To conduct a meeting and consider people suggestions	S. Chigoli and the Village Head	4th January 2009
4.Thieves	To create and strengthen security rules	Mr B, Kanolo and the Village Head	14th December 2008
5. Diseases which attack the crops.	Making Liquid Bocashi and using it	M.Z Malunga and extension officer.	26th February 2009
	Making contributions to buy and store the pesticides		
6. Livestock attack the crops.	To conduct a meeting where to create and strengthen security rules	Mr. Smith Thawe	14th December 2008
7.Land conflicts	Holding discussions with local leaders	C. Mbewe	1st December 2008
8.Contributions to the Engine fuel	Encouraging the farmers to contribute	Mr. B. Kanolo and Filuda Lesson	February up to March 2009
9.Access to the reliable markets	Trainings on how to access the reliable markets.	C. Mbewe and the extension worker	15th December 2008

(7) Action Plan for Bawi Irrigation Scheme

Weaknesses/threats	Activities to address the problem	Responsible people(s)	Due Date(s)
1. Poor management of irrigation canals.	Trainings on the proper care of the canals and management	Mr Jana and IO	28th February 2009
2. Absenteeism to the meetings by other farmers.	Reminding farmers on the constitutional laws and finding proper reinforcement measures	Mr Juwawo	24th November and continuous
3. Other farmers do not follow extension advices/services.	Meeting to address the importance of the advice on the farming methods	Mrs Simoni and Mrs Kalimbira	24th November 2008
4. Late payments to the scheme loans.	Training on the importance of scheme bank.	AEDO and Mr Biyasi	24th November 2008
5. Improper care to the irrigation equipments.	Training on the management of the irrigation equipments	IO and Mr Chidanilo	4th March 2009
6. Not following the rules set by the scheme.	Reminding the farmers on the constitution time and again	Mr Juwawo	24th November 2009 and continuous
7. Not having exchange visits to other schemes	Visitation tours to other schemes	Mr Kalele	28th February 2009

8. High water demands due un rehabilitated weirs like 1, 2, 3, 4, 6, 8, 9, 10, 11, 12, 13, and 14	To make an arrangement from the farmers, government, JICA to construct other weirs	Mr Kalele, AEDO and the Village Head.	24th November 2008
9. Other surrounding villagers refuse farmers to use the water resource.	To acquire the water rights	Mr Juwawo	28th November 2008
10. Threats from surrounding villages that JICA will take irrigation land from them.	Sensitization meetings on the JICA programmes	Mr E. Kandison and the VH Adam	18th November 2008
11. Rumours that irrigation degrades the soil fertility.	Trainings and awareness on importance of irrigation, crop rotation and manure making	Mr Chidaliro and the AEDO	24th November 2008
12. Thieves	Forming a police Forum	Mr Chitenji	18th November 2008 and continuous
13. Scrambling for leadership positions.	Leadership trainings to scheme members	AEDO and Mrs Simion	27th November 2008
14. Destructions by water to some weir.	Proper construction of other weirs in the scheme	IO and Mr Jana	28th February 2009
15. Pest and disease attacks e.g. wilting and stock borers	Training on management of the crop pest and diseases	Mr S. Siumbuza and the AEDO	16th February 2009

(8) Action Plan for Chibwana Irrigation Scheme

Weaknesses/threats	**Activities to address the problem**	**Responsible people(s)**	**Due Date(s)**
1. Poor circulation flow of the water in the canals because they are not cemented.	Lining and Cementing the irrigation canal	Mr Tapwata, and SAIO	28th February 2009
2. Price increases of the fertilizer	Using group purchasing on the fertilizer input	Mr Mpute and Mr Tapwata	March to April 2009
3. Backbiting from the surrounding people	The village headmen to meet and inform the people on importance of the irrigation scheme	Mr Tapwata and GVH Chibwana	30th November 2008
4. Theft	Forming policing groups sensitization to the village members	Mr Tapwata and GVH Chibwana.	30th November 2008.
5. Insufficient water supply in the dry season	Training on the proper utilization of water and planting early e.g. after the rain season.	Mr Chozaza, and SAIO	28th February 2009
6. Price fluctuations when they harvest.	Selling the produce in a group	Mr Njawala and Mr J. Phiri	25th November 2008 and continuous
7. Pest and disease attacks	Buying pesticides and sprayers	Mr Pute and Ms M. Kuchaga	30th April 2009

Table A11-5 Comments given by Farmers in Farmer Workshops

(1) Farmer Workshop held on November 2008 for Bethani and Chiwoza Dam Schemes (Diversion Weir and Impounding Dam Type)

Subject	Views from the Participants	Frequency
What are Lessons drawn from the workshop?	1. Sharing of ideas helps solve problems	6
	2. Learnt issues from other schemes	12
	3. Importance of manure	1
What were Successes in the winter season?	1. We have realized more income/food	7
	2. Production has increased/will increase	8
	3. Managed to make manure/improved soil fertility	5
What are important key to summer crop improvement?	1. Good preparation for the input	1
	2. Solve problems in the schemes	9
	3. Early preparation	12
	4. Working hard in the schemes	1
Comments and suggestions for the workshop subjects and program improvement	1. Time was not enough with the training/time management	4
	2. Visitation tours to be made	5
	3. There should be unity and coordination	4
	4. JICA should continue	2
	5. Lodging place to be good	1
	6. Provision of food to traveling farmers	1
	7. Everything was well/Encouragement	7

(2) Farmer Workshop held on November 2008 for Mantha, Kachere and Chaseta Schemes (Motorized Pump Type)

Subject	Views from the Participants	Frequency
What are Lessons drawn from the workshop?	4. Sharing of ideas helps solve problems	9
	5. Types of crops grown in other schemes, their management building relationships	1
	6. Learnt issues from other schemes	18
What were Successes in the winter season?	4. We have realized more income/food	4
	5. Production has increased/will increase	4
	6. Good leadership and coordination	1
What were shortfalls in the winter season?	1. Leadership and coordination	9
	2. Expensiveness of inputs/lack of other raw materials	4
	3. Lack of skills and laziness	3
	4. No or low harvest	3
What are important key to summer crop improvement?	5. Good preparation for the input	6
	6. Solve problems in the schemes/following action plan	8
	7. Early preparation	6
	8. Fundraising and hard working	5
Problems in the management and operation of the scheme	1….Leadership problems	2
	2 Finance	12
	3 Lack of unity and coordination	11
	4 Pests attacks and the negative external	3

	matters	
Impacts of the motorized pump	1 Increase production and income	4
	2 They were able to plant crops and irrigation	4
Challenges of the motorized pump	1 Fuel problems/failure to buy the fuel and other parts	4
	2 Water leakages and other damages	9
	3 Lack of experience	4
Comments and suggestions for the workshop subjects and program improvement	8. Time was not enough with the training/proper timing of the workshop	2
	9. Visitation tours to be made/tours after workshop	6
	10. Continued support on fuel, trainings and other raw materials	6
	11. Conducting trainings on scheme management trainings/farmers to work hard	6
	12. Allowances for the farmers and change of place	9

(3) Farmer Workshop held on November 2008 for Titukulane, Bawi and Chibwana Schemes (Diversion Weir Type)

Subject	Views from the Participants	Frequency
What are Lessons drawn from the workshop?	7. Sharing of ideas helps solve problems	6
	8. Types of crops grown in other schemes and their management	1
	9. Learnt issues from other schemes	16
	10. Importance of manure	1
What were Successes in the winter season?	7. We have realized more income/food	5
	8. Production has increased/will increase	10
	9. Poverty alleviation	2
What were shortfalls in the winter season?	5. No enough water for irrigation	2
What are important key to summer crop improvement?	9. Good preparation for the input	7
	10. Solve problems in the schemes	5
	11. Early preparation	6
	12. Working hard in the schemes	3
Comments and suggestions for the workshop subjects and program improvement	13. Time was not enough with the training	11
	14. Visitation tours to be made	4
	15. The JICA program should continue	1
	16. Lodging place to be good and food enough	7
	17. Allowances for the farmers	2

APPENDIX 12

ENVIRONMENTAL IMPACT ASSESSMENT AND WATER RIGHT

APPENDIX 12 ENVIRONMENTAL IMPACT ASSESSMENT AND WATER RIGHT

Contents

Attachments

APPENDIX 12 ENVIRONMENTAL IMPACT ASSESSMENT AND WATER RIGHT

1. Environmental Impact Assessment (EIA) Clearance

In Malawi, implementers must obtain Environmental Impact Assessment (EIA) certificate for any activity on irrigation development for both existing and new schemes with the size of service area of more than 10 ha. The medium-scale irrigation schemes are also required to obtain the EIA clearance. The Project Management Unit as an implementer of the A/P will undertake the process to the Environmental Affairs Department (EAD).

The EAD under the Ministry of Lands, Natural Resources, Physical Planning and Services (MoLNRPPS) is responsible for administering environmental policy and legislation, and in charge of processing and clearance of the Environmental Impact Assessment (EIA). According to the EIA Guidelines for the Irrigation and Drainage Project 2002, all irrigation development projects with irrigation service areas of 10 ha and above shall be examined and determined by the EAD based on screening criteria. For this purpose all developers are required to submit to the Department a project brief to provide necessary information for judgment.

In the general EIA process, after the screening of the project by submitting the Project Environmental Checklists accompanied with MK50,000 as the initial scrutiny fees, it is determined whether the project will be required to conduct the EIA, or required to submit the Environmental Management Plan then to commence the project, or not required then to proceed the implementation.

A sample letter for the submission of project brief and project environmental checklists are attached in this Appendix 12.

2. Water Right Certificate

Water rights to abstract irrigation water from rivers have to be registered in Malawi. The Water Resources Board (WRB) under the Ministry of Irrigation and Water Development (MoIWD) grants water rights and ceases granting additional rights to water abstractions in those cases where basins are fully developed or areas where the WRB feels that allocations are already exceeded. Field visit will be made by the technical team composing of the WUASU of DoI, WRB and PMU as an implementer to assess the situation on the ground, namely use of the water right, flow amount in the stream/river, abstraction for the scheme and other water users in the area, etc.

Application for the water user registration for irrigation purpose shall be accompanied with information such as: 1) application forms with registration fee of K3,000, 2) coordinates reference of abstraction point, 3) map sheet number where irrigation scheme is located, 4) district / TA where scheme is located, 5) Sketch map of irrigation scheme, 6) address of water users, and others. Water right is renewable at every five years for surface water and every 10 years for groundwater.

An application form for the water right certificate is attached in this Appendix 12.

Attachment A12-1

THE STUDY ON THE CAPACITY DEVELOPMENT OF SMALLHOLDER FARMERS FOR THE MANAGEMENT OF SELF-HELP IRRIGATION SCHEMES (MEDIUM-SCALE)

JICA TECHNICAL COOPERATION: SANYU CONSULTANTS INC.

Office: c/o DEPARTMENT OF IRRIG'N, MIN. OF IRRIGATION & WATER DEVELOP'NT
Lilongwe 3, Tel; +265-(0)9-664163 / (0)8-734964 (Cell)l

Ref. No: 2007-03
Date: 24th July, 2007

To: Mr. Sandram C.Y. Maweru
Director of Irrigation Service, MOIWD

From: Shunichi Hosono
Team Leader, JICA Study Team

Re: Submission of Project Briefs for EIA Clearance for Verification Project Sites

Dear Sir,

We, JICA Study Team are undertaking the Phase-2 Study on the Capacity Development of Smallholder Farmers for the Management of Self-Help Irrigation Schemes (Medium-Scale) in close collaboration with the DOI at central level as well as with ADD, DADO and EPA at district levels.

With regard to the Verification Study, rehabilitation plans of selected eight schemes have been formulated. According to the Environmental Impact Assessment (EIA) Guidelines, the DOI as an implementer shall submit the Environmental Affairs Department (EAD) under MONREA the "Project Brief" of the intended irrigation schemes for rehabilitation under the Verification Study.

In this connection, we would hereby submit the Project Briefs of eight irrigation schemes intending to be rehabilitated. Your prompt action to the EAD to obtain the EIA clearance would be highly appreciated in order to implement the Verification Project smoothly. The selected eight verification sites are the following irrigation schemes at five ADDs;

No.	Code No	Name of Scheme	ADD	District	EPA	Area (ha)
1	Mz-4	Mantha Irrigation Scheme	Mzuzu	Mzimba	Luwelezi	8.0
2	Mz-11	Bethani Irrigation Scheme	Mzuzu	Rumphi	Mhuju	22.0
3	Kas-40	Kachere Irrigation Scheme	Kasungu	Kasungu	Chipala	6.4
4	Kas-46	Chioza Dam Irrigation Scheme	Kasungu	Kaungu	Chulu	10.0
5	Li-2	Chaseta Irrigation Scheme	Lilongwe	Lilongwe	Mlomba	12.0
6	Li-21	Bawi Irrigation Scheme	Lilongwe	Ntvheu	Manjawira	6.3
7	Sa-13	Mpamantha Irrigation Scheme	Salima	Nkhotakota	Nsanama	80.0
8	Ma-1	Chibwana Irrigation Scheme	Machinga	Machinga	Linga	85.0

Your usual understandings and cooperation rendered to us will be highly appreciated, we remain.

Yours faithfully,

Shunichi Hosono
Team Leader, JICA Study Team

Attachments: Project Briefs of eight sites

c.c: 1) Mr. Takanori Satoyama
Project Formulation Advisor
JICA Malawi Office

Attachment A12-2

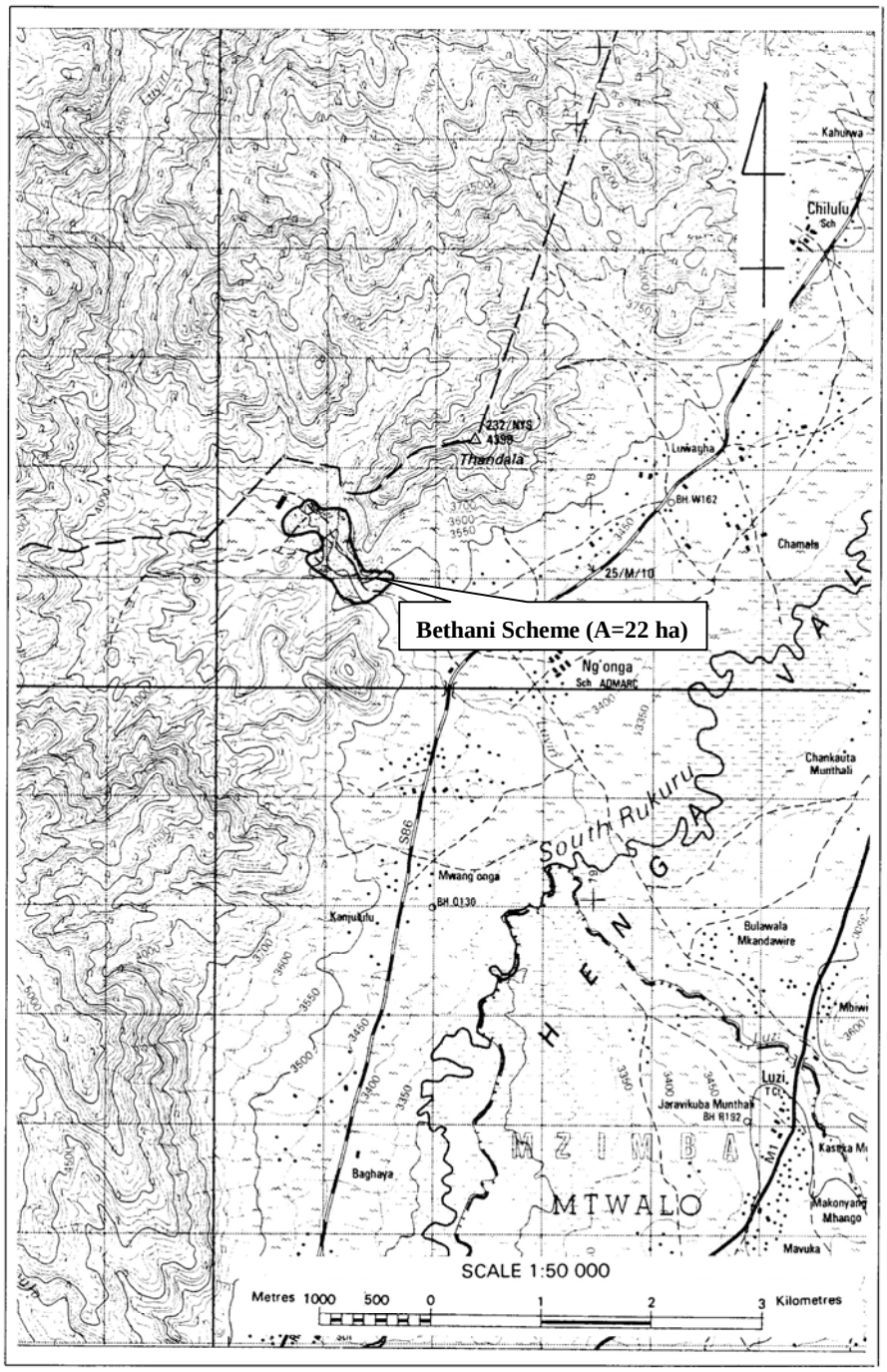
Project Brief for Enquiring Environmental Impact Assessment (EIA)
on
Capacity Development of Smallholder Farmers for Management of Self-Help Irrigation Schemes (Medium-Scale)

1. The name of project	**Rehabilitation of Bethani Irrigation Scheme (Area : 22 ha)** (ADD : Mzuzu, District : Rumphi, EPA : Mhuju)
2. The nature of the project	The Study on the Capacity Development of Smallholder Farmers for the Management of Self-Help Irrigation Schemes (Medium-Scale)
3. The name of the developer	Department of Irrigation (DOI), Ministry of Irrigation and Water Development (MOIWR) and Ministry of Agriculture and Food Security (MOAFS)
4. The activities to be undertaken	Rehabilitation of following irrigation facilities; - Rehabilitation of diversion weir (desilting of deposited materials) and intake structure - Newly provision of distribution boxes (3 for Bethani-A and 4 for Bethani-B areas)
5. Possible products and byproducts anticipated	Increase in crop production, especially for dry (winter) season crops (maize and vegetable), and lead to sustainable living conditions in rural areas.
6. The number of people the project shall employ	Project is to be implemented with participatory approach by the following beneficial farmers without payment; - Rehab. of weir : 60 man-day (6 people x 10 day) - Prov. of div. box : 240 man-day (8 people x 30 day) Total 300 man-day
7. Area of land, air and water that may be affected	It could be anticipated that no affects to land, air and water, because of minor rehabilitation works of irrigation facilities such as diversion weir, canal and related structures.
8. The basic description of project size, location, preliminary designs, including any alternatives, which are being considered (e.g. site, technology, construction and operation procedures, handling of waste)	- Project size : Small-scale (Area = 22 ha) - Location : ADD : Mzuzu District : Rumphi EPA : Mhuju - Design : Preliminary level - Project cost : 212,000 MK - Construction : by farmers group - O&M : by farmers group
9. The stage of the project site or site alternatives and a site plan, as it is currently known. Maps and plans should be at 1:50,000 or larger. Thematic information (e.g. roads,	The scheme is presently operational for mainly maize cropping under the management of farmers group. Figure 2-1 and Figure 2-2 show location map and schematic diagram of the scheme.

streams, vegetation types) should be mapped using standard symbols identified in a legend	
10. A discussion of which aspects of the project are likely to cause environmental concerns and of proposed environmental measures	No aspects to cause environmental problems

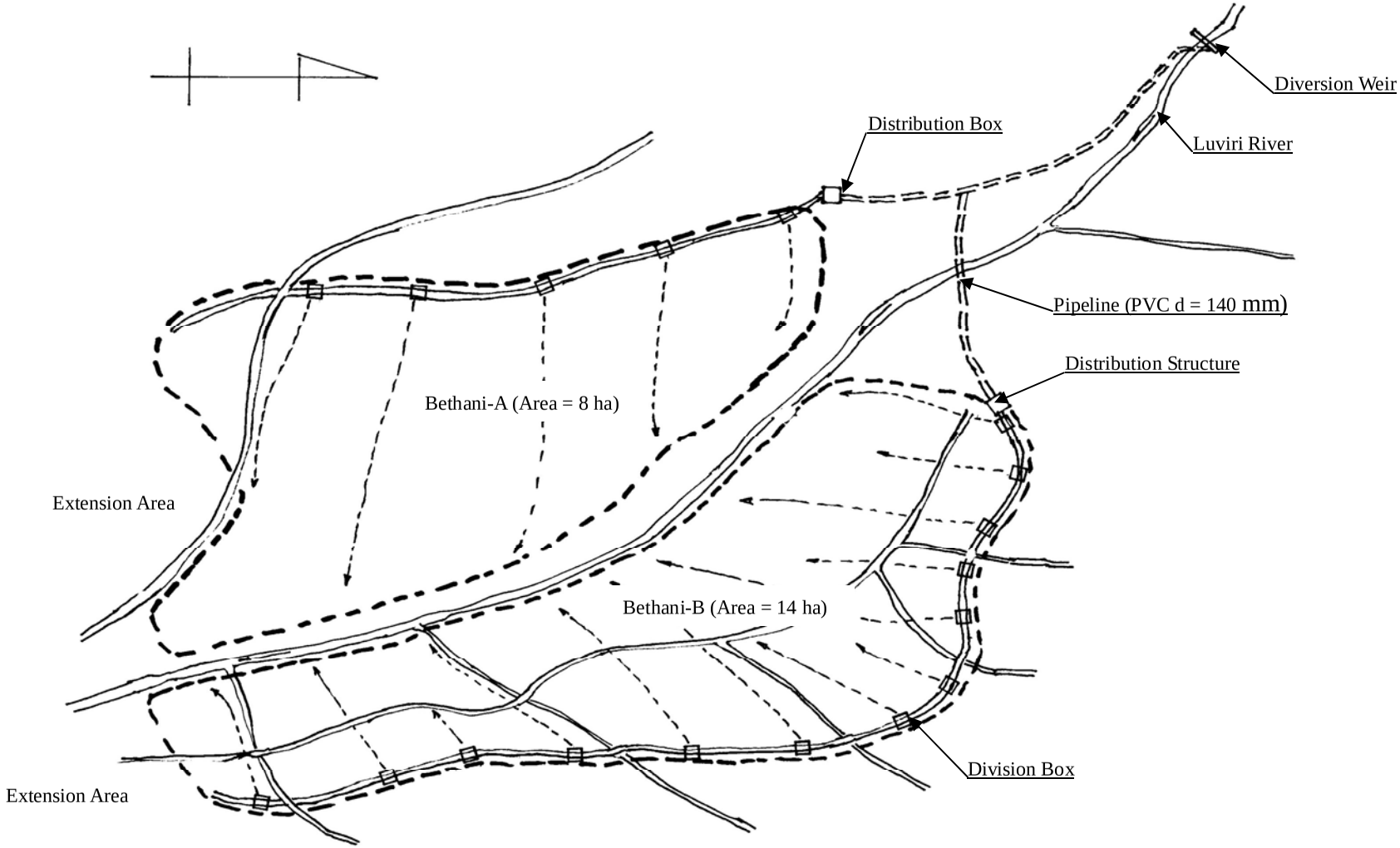
Figure 2-1 Location Map of Verification Site for Bethani Irrigation Scheme (Mz-11)

ADD : Mzuzu
District : Rumphi
EPA : Mhuiu



Note : Irrigation area (A) shows dry season area.

Figure 2-2 Schematic Diagram of Bethani Irrigation Scheme (Mz-11)



Attachment A12-5

3 **Project Environmental Checklists**
Simplified initial screening checklists for highlighting possible environmental impacts of microprojets and identifying steps to minimise them

No. 3 – Small Scale Irrigation

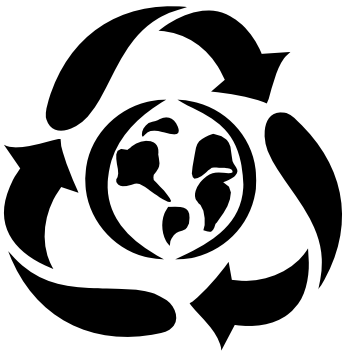
*The **combined** impact of all the irrigation projects in a DDP should be evaluated together on one of these sheets*
Large negative impacts may indicate a need to comply with the EAD's EIA Process

Project Name: Bethani Irrigation Scheme	**District: Rumphi**	**Date: 5th October 2007**

Environmental Impacts of Irrigation Project(s) • *Not in any particular order*	**✓Tick the magnitude of the impacts without any mitigation measures**							**Mitigation Measures** • *Not exhaustive - other measures are encouraged*	
	Positive				Negative				
	Large	Medium	Small	Nil or N/A	Small	Medium	Large		**Tick mitigations chosen ✓**
Waterlogging of soil				✓				Micro-engineering solutions	
Increased exposure to agro-chemical pollutants				✓				Integrated management Training	
Spread of disease vectors				✓					
Salinisation or alkalinisation of soils				✓				Routine WQ monitoring	
Relocation of people				✓				Community participation & buy-in	
Reduced water quality				✓					
Reduced flow and availability of water for users				✓				Follow provisions of Water Act	
Reduced dilution of existing pollutants entering receiving waters				✓				Address pollutants at source	
Population migration to the area				✓				Integrate with rural planning	
Nuisance - smell or noise				✓				Planning and siting	
Loss of soil fertility through leaching				✓					
Lowering of water table or long term depletion of water resource				✓				Apply extraction and/or consumption limits Holistic catchment mangement Water conservation	
Increasing incidence of communicable diseases				✓				Communication and awareness	
Increase in costs of water treatment				✓					
Increase in communicable diseases				✓					
Impacts on aquatic flora and fauna downstream				✓				Monitor indicator species Routine WQ monitoring	
Hazard of water contamination				✓					
Erosion of economic land value				✓				Plan land use change Compensation, relocation	
Disruption of land tenure, ownership rights				✓				Community participation & buy-in	
Damage to historical/cultural monuments or artifacts				✓				Relocation	
Creation of social conflict or inequity				✓				Community participation & buy-in	
Contamination of water by human or animal activity				✓				Integrate with rural planning	
Change in microclimate				✓					

Please turn over…

Global Sustainability Check Will the project(s): **Tick boxes if yes ✓**	
use irreplaceable natural resources or fossil fuels?	
result in an overall net loss of top soils?	
make increased use of natural resources for short rather than long term economic gains?	
impact negatively on national energy balance?	
have a net negative effect on the national carbon balance?	
be a hazard to any rare or endangered species?	
accelerate rural-to-urban migration?	
increase the gap between rich and poor people?	
If this project operated forever, would its natural resource base eventually be exhausted?	



Completed by EDO:	
Is this project likely to need an EIA (YES/NO)?	
List A/B paragraph numbers	
Date forwarded to DEA Head Office:	
Date exempted:	

Completed by Director EAD	
Signature:	
Date:	

Attachment A12-6

Project Brief for Enquiring Environmental Impact Assessment (EIA)
on
Capacity Development of Smallholder Farmers for Management of Self-Help Irrigation Schemes (Medium-Scale)

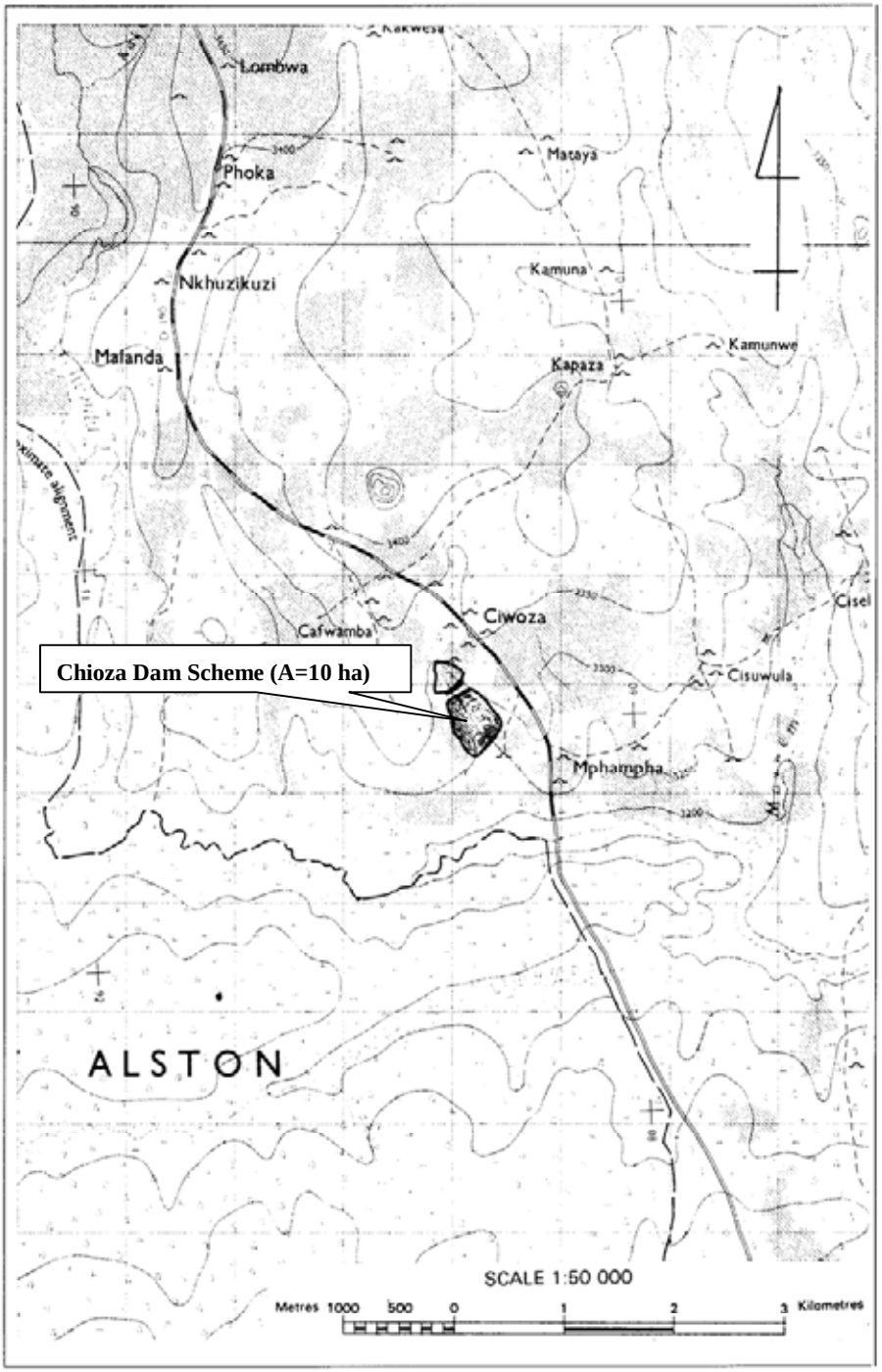
1. The name of project	**Rehabilitation of Chioza Dam Irrigation Scheme** **（Area : 10 ha）** (ADD : Kasungu, District : Kasungu, EPA : Chulu)
2. The nature of the project	The Study on the Capacity Development of Smallholder Farmers for the Management of Self-Help Irrigation Schemes (Medium-Scale)
3. The name of the developer	Department of Irrigation (DOI), Ministry of Irrigation and Water Development (MOIWR) and Ministry of Agriculture and Food Security (MOAFS)
4. The activities to be undertaken	Rehabilitation of following irrigation facilities; - De-silting of reservoir - Repair of spillway - Rehabilitation of main canals (right and left main canals of 650 m each) - Rehabilitation of canal structure
5. Possible products and byproducts anticipated	Increase in crop production, especially for dry (winter) season crops (maize and vegetable), and lead to sustainable living conditions in rural areas.
6. The number of people the project shall employ	Project is to be implemented with participatory approach by the following beneficial farmers without payment; - De-silting reservoir : 900 man-day (30 people x 30 day) - Rehab. of spillway : 150 man-day (10 people x 15 day) - Rehab. of canal : 600 man-day (20 people x 30 day) - Rehab. of structure : 150 man-day (10 people x 15 day) Total 1,800 man-day
7.	Although desilting works for the reservoir are planned, but these works could be anticipated that no affects to land, air and also water, because desilting works are to be implemented by manual after drying–up the reservoir in October and November.
8. The basic description of project size, location, preliminary designs, including any alternatives, which are being considered (e.g. site, technology, construction and operation procedures, handling of waste)	- Project size : Small-scale (Area = 10 ha) - Location : ADD : Kasungu District : Kasungu EPA : Chulu - Design : Preliminary level - Project cost : 318,000 MK - Construction : by farmers group - O&M : by farmers group
9. The stage of the project site or site alternatives and a site plan,	The scheme is presently operational for mainly maize and vegetable cropping using the stored water in Chioza reservoir,

as it is currently known. Maps and plans should be at 1:50,000 or larger. Thematic information (e.g. roads, streams, vegetation types) should be mapped using standard symbols identified in a legend	under the management of farmers group. Figure4-1 and Figure 4-2 show location map and schematic diagram of the scheme.
10. A discussion of which aspects of the project are likely to cause environmental concerns and of proposed environmental measures	No aspects to cause environmental problems

Attachment A12-7

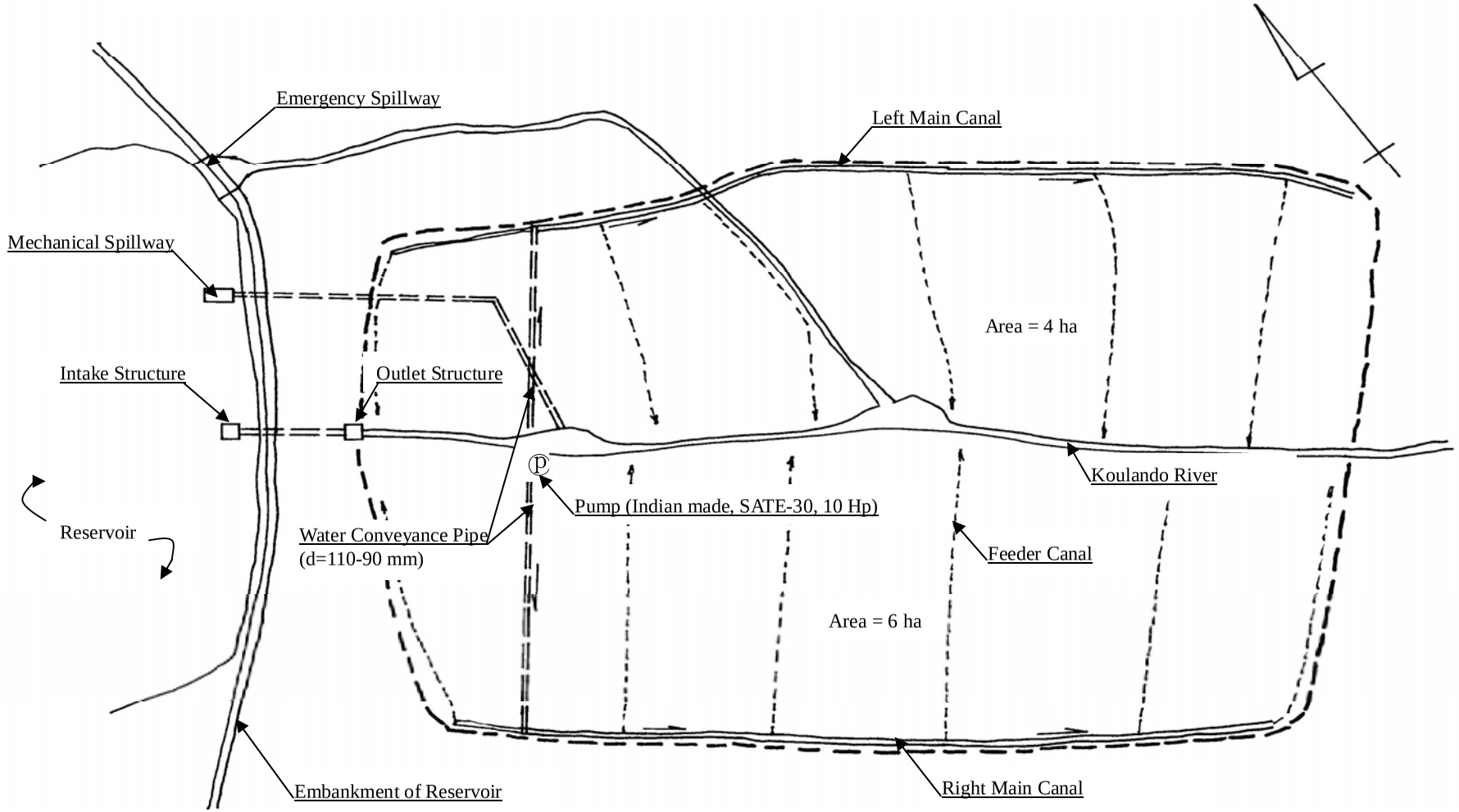
Figure 4-1 Location Map of Verification Site for Chioza Dam Irrigation Scheme (Kas-46)

ADD : Kasungu
District : Kasungu
EPA : Chulu



Note : Irrigation area (A) shows dry season area.

Figure 4-2 Schematic Diagram of Chiwoza Dam Irrigation Scheme (Kas-46)



Attachment A12-9

3 **Project Environmental Checklists**
Simplified initial screening checklists for highlighting possible environmental impacts of microprojets and identifying steps to minimise them

No. 3 – Small Scale Irrigation

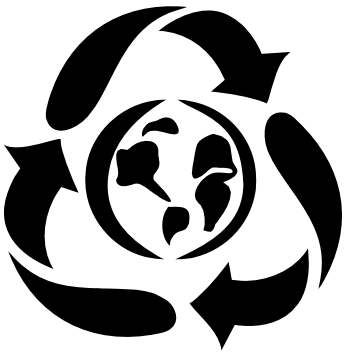
*The **combined** impact of all the irrigation projects in a DDP should be evaluated together on one of these sheets*
Large negative impacts may indicate a need to comply with the EAD's EIA Process

Project Name: Chiwoza Dam Irrigation Scheme	**District: Kasungu**	**Date: 5th October 2007**

Environmental Impacts of Irrigation Project(s) • *Not in any particular order*	**✓Tick the magnitude of the impacts without any mitigation measures**							**Mitigation Measures** • *Not exhaustive - other measures are encouraged*	
	Positive				Negative				
	Large	Medium	Small	Nil or N/A	Small	Medium	Large		**Tick mitigations chosen ✓**
Waterlogging of soil				✓				Micro-engineering solutions	
Increased exposure to agro-chemical pollutants				✓				Integrated management Training	
Spread of disease vectors				✓					
Salinisation or alkalinisation of soils				✓				Routine WQ monitoring	
Relocation of people				✓				Community participation & buy-in	
Reduced water quality				✓					
Reduced flow and availability of water for users				✓				Follow provisions of Water Act	
Reduced dilution of existing pollutants entering receiving waters				✓				Address pollutants at source	
Population migration to the area				✓				Integrate with rural planning	
Nuisance - smell or noise				✓				Planning and siting	
Loss of soil fertility through leaching				✓					
Lowering of water table or long term depletion of water resource				✓				Apply extraction and/or consumption limits Holistic catchment mangement Water conservation	
Increasing incidence of communicable diseases				✓				Communication and awareness	
Increase in costs of water treatment				✓					
Increase in communicable diseases				✓					
Impacts on aquatic flora and fauna downstream				✓				Monitor indicator species Routine WQ monitoring	
Hazard of water contamination				✓					
Erosion of economic land value				✓				Plan land use change Compensation, relocation	
Disruption of land tenure, ownership rights				✓				Community participation & buy-in	
Damage to historical/cultural monuments or artifacts				✓				Relocation	
Creation of social conflict or inequity				✓				Community participation & buy-in	
Contamination of water by human or animal activity				✓				Integrate with rural planning	
Change in microclimate				✓					

Please turn over…

Global Sustainability Check Will the project(s): **Tick boxes if yes ✓**	
use irreplaceable natural resources or fossil fuels?	
result in an overall net loss of top soils?	
make increased use of natural resources for short rather than long term economic gains?	
impact negatively on national energy balance?	
have a net negative effect on the national carbon balance?	
be a hazard to any rare or endangered species?	
accelerate rural-to-urban migration?	
increase the gap between rich and poor people?	
If this project operated forever, would its natural resource base eventually be exhausted?	



Completed by EDO:	
Is this project likely to need an EIA (YES/NO)?	
List A/B paragraph numbers	
Date forwarded to DEA Head Office:	
Date exempted:	

Completed by Director EAD	
Signature:	
Date:	

FORM WRB.1

APPLICATION FOR A GRANT OF WATER RIGHT/CERTIFICATE OF EXISTING WATER RIGHT

(SURFACE WATER ONLY)

This form is to be submitted in duplicate, to the Chairman of Water Resources Board, Private Bag 390, Lilongwe 3.

NOTES: 1. This form is applicable only for application involving the diversion, extraction or use of surface water and is not applicable to ground water-application for which should be made on form **WRB.2.**

2. Parts I, II, and III are to be completed by all applicants.
   Schedules A, B, C, D, E and F to be completed as appropriate.
3. All applications must be accompanied by Maps/Plans (see section 18).
4. Instructions for completing this form are given on page 8.
5. Only Part I should be completed in respect of applications for renewals of an existing grant under identical conditions.

NOTE: Compliance to environmentally friendly management of water resources and integrated water resources management is mandatory to all users of the water resources

12-15

PART I

NOTE: This paragraph is only applicable to applications to record an existing right under the Act.

(1) Full name/s of applicant/s..	
(2) Address- Residential.. .. .. - Postal	
(3) *Give details of existing right. (If space is not sufficient, please give details on a separate sheet attached to application.)	
(4) State whether (a) Owner (b) Manager (c) Agent If (b) or (c) give name and address of Owner.	
(5) Name and location of farm, estate or holding for which water is required.	
(6) Particulars of land (a) State freehold or leasehold (b) If leasehold give expiry date of lease (c) Registered No. and date of registration (d) Hectarage	
(7) Name and description of type of body of water from which the water required is to be diverted, stored or used.	
(8) Is the body of water described above situate in, or does it abut to, or flow in or out of Customary Land. State which.	
(9) Describe (a) The point of abstraction or diversion and /or (b) The point of storage and (c) The point of use	
(10) State maximum amounts of water required under the various headings. (Fuller details should appear in Schedule A, B, C, D, and E as appropriate.)	QUANTITY OF WATER REQUIRED LITRES PER DAY
(a) Domestic purposes	.....
(b) Public purposes	.....
(c) Industrial purposes	.....
(d) Power purposes (including drive water for ram)	.....
(e) Irrigation	.....
(f) Other (give details)	.....
TOTAL	

*Delete as appropriate.

NOTE: Compliance to environmentally friendly management of water resources and integrated water resources management is mandatory to all users of the water resources

PART II
METHOD OF DIVERSION/EXTRACTION

11. DIVERSION BY GRAVITATION (by means of a canal and/or pipe)

(a) Details of canal

	Metres	Centimetres
Width at bottom	.....	.....
Width at full supply level	.....	.....
Depth of water at full supply Level	.....	.....

Length.....Kilometres/metres

Gradient, fall in 100.00 metres.....metres

Average velocity in metres per second.....

Estimated discharge at full supply.....

Materials of which canal is constructed.....

.....

.....

.....

(b) Details of pipe

Internal diameter.....centimetres

Length.....kilometres/metres

Hydraulic Gradient, fall in 30.48 metres.....metres

Description of material of pipe thickness thereof.....

.....

(b) Details of any other structures such as siphons, flumes, tunnels, etc.

(c) (i) Will any of the above canals, pipes and/or structures be situated on holdings of other landowners ?

(ii) If the answer to (i) is yes give details of all land or lands affected.

Yes/No

12 DIVERSION BY PUMPING (including by means of a ram*)
Fill in particulars.

*In the case of a ram *omit (b), (c),* and *(e).* Questions *(f), (g)* and *(h)* refer to the drive pump. Also complete Schedule E.

(a) Type of pump.....

(b) Type of driving machine and fuel used.....

.....

(c) Brake horse power of *(b)*..... .....B.H.P

(d) Approximate elevationof pump above sea-level

.....meters

(e) How pump is connected to driving machine.....

.....

(f) Internal diameter of suction main.....centimetres

(g) Height of suction .....metres (maximum)

(h) Length of suction pipe.....metres

(i) Height to which water is to be lifted above pump

.....metres

(j) Internal diameter of delivery pipe.....centimetres

(k) Length of delivery pipe.....metres

(l) Pumping hours per day.....hours

(m) Quantity of water to be pumped when plant is working

.....litres per hour

(n) (i) Will the pump and its accessories be situated on holdings of other landowners?

(ii) If the answer to (i) is yes give details of all other land(s) affected.

Yes/No

NOTE: Compliance to environmentally friendly management of water resources and integrated water resources management is mandatory to all users of the water resources

13. POLLUTION
Would the water now applied for be used for any purposes or in any process that will increase its burden of silt, gravel or boulders or cause it to be injurious directly to public health, to stock, to fish, or to crops or gardens irrigated with such water? Yes/No

If the answer to the above is "Yes" describe fully what steps are Proposed to render the efficient and the residue of it innocuous and pure before returning it to the stream.

14. State the numbers and details of any other Grants of Water Right held in respect of the land described in para. (6). If nil state "Nil".

15. State the estimated period of construction of the works. .....Months

16. State the period after the completion of the works when it is estimated that all the water now applied for will be beneficially used.

17. State the period for which the Grant is required.

18. The following Map Nos.....and Plan Nos..... are sent herewith in triplicate and are hereby declared to form part of the application.

19. The address(es) of the owner(s) of the land(s) which may be affected by the proposed works and whose name(s) and holding(s) is/are shown on the map referred to in paragraph (18) above is/are given in the schedule attached hereto.

20. The following reports and/or documents are sent herewith in support of my application.....

.....

.....

21. I agree to supply any further information which may be required by the Water Resources Board.

NOTE::This paragraph Is *only* applicable to applications to record an existing right under the act

22. *I enclose herewith crossed cheque/Postal Order/Money Order No..... for K3,000 to cover the prescribed fee for this application and undertake to pay the Malawi government on demand the cost of insertion in the *Government Gazette* and in at least one newspaper circulating in Malawi of a Notice requiring any person objecting to the issue of a grant of water Right to lodge such a complaint with the Chairman of the Water resources board.

.....
Signature of applicant or Duly Authorised Agent

Date.....

Copies of the following schedules are attached*

A Domestic Purpose
B Public Purposes
C Industrial Purposes
D Irrigation Purposes
E Use of Water for Power Generation
F Construction of Dam

*** Delete as appropriate.**

NOTE: Compliance to environmentally friendly management of water resources and integrated water resources management is mandatory to all users of the water resources

SCHEDULE A
DOMESTIC PURPOSES

State whether water is required for:	QUANTITY OF WATER REQUIRED LITRES PER DAY
(a) Household and sanitary use:	
(i) No. of low density houses.....	
(ii) No. of occupants of medium density houses.....	.....
(iii) No. of occupants of high density houses.....	
(b) Watering stock:	
(i) No. of large stock.....	
(ii) Type of large stock.....	
.....	
.....	
(iii) No. of small stock.....	
(iv) Type of small stock.....	.....
.....	
.....	
(c) Cattle and sheep:	
(i) No. of dips.....	
(d) Other essential requirements or farming operations which are not of an industrial nature. State use(s) to which water will be put	
.....	
.....	
.....	.....
.....	
TOTAL	.....
	.....

SCHEDULE B
PUBLIC PURPOSES

Fill in appropriate space if water is required for-

	QUANTITY OF WATER REQUIRED LITRES PER DAY	
	PRESENT	*.....YEARS HENCE
(a) Municipal, township and community use or supply of water to persons other than the operator in consideration of payment thereof	.....	.....
(b) Any other use other than (c) above covered by another schedule	.....	.....
(c) TOTAL water required for public purposes.	.....	.....
	.....	.....

* Fill in the number of years hence upon which your estimate is based. If applying now for a Grant covering a greater quantity of water than is at present required, the estimate of number of years should correlate to the quantity of water applied for.

	Low Density No. of Houses	Medium Density No. of Occupants	High Density No. of Occupants
(d) When water is required under (a) above the following information should be supplied as far as possible-			
(i) Estimated population at present	.....	.....	.....
(ii) Estimated population 5 years hence	.....	.....	.....
(iii) Estimated population 10 years hence	.....	.....	.....
(iv) Estimated population 20 years hence	.....	.....	.....

(e) When water is required under (b) above give details of use to which water is to be put.

(f) State whether water is to be supplied to any person, other than the applicant, in consideration of payment thereof. State 'Yes' or 'No'.

NOTE: Compliance to environmentally friendly management of water resources and integrated water resources management is mandatory to all users of the water resources

SCHEDULE C
INDUSTRIAL PURPOSES

State the quantity required in the appropriate space-	QUANTITY OF WATER REQUIRED LITRES PER DAY	THE NORMAL AND MAXIMUM NUMBER OF HOURS PER DAY FACTORY WILL BE WORKING		PERIOD DURING YEAR WHEN WATER WILL BE REQUIRED
		Normal	Maximum	
PURPOSE (a)Steam raising, cooling and condensing water	.....	.....	.....	.....
(b) Manufacture	.....	.....	.....	.....
(i) Process water	.....	.....	.....	.....
(ii) Dilution of effluent	.....	.....	.....	.....
(c) Coffee pulping and washing	.....	.....	.....	.....
(d) Other Purposes	.....	.....	.....	.....
(e) TOTAL water required for industrial purposes	.....			
(f) If water is required for (b) or (d) above give details of use to which water is to be put.				

SCHEDULE D
IRRIGATION PURPOSES

State the following-

	CROP	AREA (HECTARES)	GROWING SEASON
(a) Crops to be irrigated and area of each crop	(1).....	.....	.....to.....
	(2).....	.....	.....to.....
	(3).....	.....	.....to.....
(b) Quantity of water required	(4).....	.....	.....to.....

QUANTITY OF WATER REQUIRED LITRES PER DAY DURING

January.....	May.....	September.....
February.....	June.....	October.....
March.....	July.....	November.....
April.....	August.....	December.....

(c) Describe class of soil to be irrigated
d) Describe nature of sub-soil with particular reference to its drainage possibilities.
(e) Describe in detail any works to be constructed to drain the irrigated lands.
(f) Where is the residue of the unused water to be disposed of? State name of water to which it is to be returned.

SCHEDULE E
USE OF WATER FOR POWER GENERATION

NOTE: Compliance to environmentally friendly management of water resources and integrated water resources management is mandatory to all users of the water resources

(Including use of water for driving rams)

State the following- (a) Purpose for which power is required (b) Brake Horse Power which is to be developed (i) Maximum (ii) Minimum (c) The gross fall or head available for power production at the following river stages (i) At low stage (ii) At normal stage (iii) At high stage (Note—(c) (i) and (c) (iii) need only be answered when the power to be developed is in excess of 100 B.H.P.) (d) The net fall or head to be used in (b) above (e) The water required to develop (b) above (f) Description and number of machines to be installed (g) How water is to be returned to the river after utilisation State length of return channel if any	.....B.H.P. .....B.H.P. .....metres .....metres .....metres .....metres .....litres per day ....metres

7

SCHEDULE F

CONSTRUCTION OF DAM

State the following— (1) (a) Nature of stream bed at site, e.g. "second rock"," fissured rock", "soil", "sand", etc. (b) Nature of walls of river at site, e.g. "sand", "soil", etc. (c) Will dam be founded on sound rock? State "Yes" or 'No" (d) Will dam be founded on any material which may be eroded by underflow? (e) Description of type of dam, e.g. "earth", "earth with core wall" (stating kind), "concrete", masonry", etc. (f) Length of crest of dam Thickness at crest Thickness at base Greatest heightof d am (g) Estimated area of reservoir at spillway level (h) Whether the submerged area at high flood level will be wholly within applicant's holding(s). If not state names of owners of land, etc., affected. (i) Whether one or both banks of the stream at the site of the dam are on the applicant's holding(s). if not, state names of owners of land, etc., affected. (j) Will any other works including weirs, already constructed or being constructed be affected by the head and/or tail water of the proposed works? State "Yes" or "No" If "Yes" give full details of works affected. (2) The following information is required if the dam exceeds 20.2 hectare metres in capacity (63.644 million litres approx.) or 4.57 metres –	....hectares
Catchment area— (a) Area of surface catchment (b) Maximum length of catchment (c) Average breadth of catchment (d) Ruling slope of catchment (e) Nature of ground of catchment (e.g. "rocky", "stony soil"," clay soil",	.....hectares .....kilometres/metres ..... kilometres/metres .....in degrees or expresses as 1m in metres

NOTE: Compliance to environmentally friendly management of water resources and integrated water resources management is mandatory to all users of the water resources

etc.). (e) Vegetation of catchment ("forest", "shrub", "pasture", "crops", etc.). (3) State if flood water is to be disposed of by means of— (a) The dam acting as a weir (b) By-pass(es) or waste weir(s) on one or both flanks (c) State width and depth of by-pass(es) Below crest level of dam (d) If by-pass(es) or waste weir(s) to be constructed state nature of material in which they will be excavated. (e) State whether such by-pass(es) or waste weir(s) are to be lined. If so state materials to be used. (f) Gradient of waste weir. (g) State other type of methods of disposal of floodwater. Give details.	8 .....wide .....deep below crest level ..... metres

INSTRUCTIONS FOR FILLING IN THE FORM

Please write distinctly.

PARTS I, II, III

Para. 1. State the names of all persons having an interest in the application. In the case of an association, company, corporation municipality, etc., the name of the association, company, corporation municipality, etc., as the case may be should be stated.

Para.2. If a company, state the registered office of the company in Malawi.

Para. 3. Give details of grounds on which existing rights is claimed. In the case a water licence issued before 1st April 1967, give licence number.

Para.5, 6. If questions not applicable, e.g. in the case of municipalities, etc, give appropriate information.

Para.7. Give a sufficient description of the spring, river, lake, etc., so that it may be identified. If unnamed give the name of the body of the water (if any) to which it is tributary. The names should, if possible, correspond with those on the 1: 50, 000 Survey maps.

Para.9. Describe as accurately as you can the various points mentioned, for example, 9 (a) "At a point on the left bank of the river, 91.44 metres upstream of the confluence of Thuchira and Khonjeni River" or "At a point on the right bank of the river, 76.2 metres downstream of the point where the boundary of the farm intersects the Likhubula River".

Para.11. If the canal or pipeline has any change of cross-section or gradient the details are to be given of each such change on a separate sheet of paper if not shown on the plan(s) accompanying this application. If any structure is proposed under section (e) plan(s) must be sent with the application.

Para. 12. The type of pump should be stated as centrifugal, ram, etc., with the maker's name thus, for example, "Braemer 6 stage centrifugal".

The type of driving machine should be similarly stated, for example, "Lister Diesel Engine Type S.R. 1".
The connection between pump and driving machine should be stated as "Vee belts" or "Direct couple", etc. as the case may be.

Para.17. Grants of Water Right are not normally issued for periods in excess of five years.

Para. 18. The map referred to should be to a scale of 1:50000 (obtainable from the Map Sales Office of the Survey Department, Blantyre) and *three* copies are to be attached to the application. The following details should be shown where applicable:

(a) The boundaries of the estate, farm, etc., for which the application is made.
(b) The point of abstraction
(c) The areas to be irrigated (if applicable).
(d) The site of the dam and area of the reservoir so formed.

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(e) The names of other holdings which might be affected by abstraction.
(f) Any other details which may be relevant to the application.
Plans or drawings should be attached showing details required in paras. (11), 912) and wherever the answers to any of the questions can be better given in the form of a drawing. 9

SCHEDULE A

The normal quantities are as follows:

Low density house	..	..	..	..	300gals. per day per house
Medium density house	..	..	..	..	50gals. per day per occupant
High density house	..	..	..	..	10gals. per day per occupant
Large stock	..	..	..	..	10gals. per head per day
Small stock	..	..	..	..	2gals. per head per day

SCHEDULE B

The population estimates should apply only to those members of the population to whom it is considered that water will be supplied.

SCHEDULE D

The growing season of crops is intended for crops with specific growing season, e.g. maize, rice, etc., not crops such as coffee, tea, etc.

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APPENDIX 13

LIST OF COLLECTED DATA

Appendix 13 List of Collected Data

In the courses of the Study, the Study Team has corrected related data and information in order to carry out the Study. The list of the corrected data is shown bellow:

Topographic Maps

1. Topographic Maps of Study Area (1/250,000), Department of Surveys, 1994.
2. Topographic Map of Study Area (1/50,000) (Partial), Department of Surveys, 1990.
3. ADD, Districts and EPA Boundary Map, Department of Land Resources and Soil Conservation.
4. Malawi Road and Tourist Map (1/1,000,000), Ministry of Transport and Public Works, Survey Department, 2002.
5. "ATLAS", Malawi Institute of Education, 2001.

Development Policy, Strategy, and Guidelines

1. "Vision 2020, The National Long-Term Development Perspective for Malawi, a Summary", Government of Malawi, 2000.
2. "Malawi and the Millennium Development Goal" September", Government of Malawi, 2005.
3. "Malawi National Strategy for Sustainable Development", Ministry of Natural Resources and Environment Affaires, 2004.
4. "Malawi Growth and Development Strategy - From Poverty to Prosperity 2006-2011", Government of Malawi.
5. "First Draft Report, A Strategy for Capacity Development for Decentralization in Malawi", Ministry of Local Government and Rural Development in Malawi, December 2005.
6. "National Land Policy 2002", Ministry of Lands, Physical Planning and Surveys, 2002.
7. "Statistical Year Book 2006", National Statistical Office, September 2006.
8. "Integrated Household Survey 2004-2005", National Statistical Office, October 2005.
9. "Welfare Monitoring Survey", National Statistical Office, 2005.
10. "National Irrigation Policy and Development Strategy", Ministry of Agriculture and Irrigation, 1998.
11. "National Irrigation Policy and Development Policy ", Ministry of Agriculture and Irrigation, June 2000.
12. "Environmental Impact Assessment Guidelines for Irrigation and Drainage Projects", Environmental Affairs Department, Ministry of National Resources and Environmental Affairs, 2002.
13. "Guidelines for Environmental Impact Assessment", Environmental Affairs Department, Ministry of Forestry, Fisheries and Environmental Affairs, December 1997.
14. "The Ministry of Agriculture and Food Security Strategic Plan: 2007-20012", Ministry of Agriculture and Food Security in Malawi, December 2006.
15. "Policy Logical Frameworks for the Establishment of the Malawi Agriculture Policy Framework", Government of Malawi, May 2006.
16. "The Governance of Food Security in Malawi", Caroline Sahley, September 2005.
17. "Food and Nutrition Security Policy", Ministry of Agriculture, June 2005.
18. " A New Agricultural Policy - a strategic agenda for addressing economic development and food security in Malawi", Ministry of Agriculture, June 2005.

19. ” Draft of the Ministry of Agriculture and Irrigation Strategic Plan”, Government of Malawi, January 2003.
20. “Malawi Agricultural and National Research Master Plan, a summary”, National Research Council of Malawi, Agricultural Science Committee, 2000.
21. “Strategic Plan to Improve Livestock Production, 2003-2008”, Ministry of Agriculture and Irrigation February 2003.
22. “National Land Resources Management Policy and Strategy “, Ministry of Agriculture and Irrigation, July 2000.
23. “Proposal for National Land Use Planning and Development Control Project”, Ministry of Lands, Housing and Survey, June 2005.

Technical Papers

1. “Irrigation, Rural Livelihoods, and Agricultural Development Project (IRLADP) - Technical Volume (Working Papers)”, World Bank.
2. “The EU in Malawi -30 Years of Development Cooperation between the European Union and the Republic of Malawi”, European Union, 2006.
3. “Annual Report 2006 on the European Community’s Development Policy and the Implementation of External Assistance”, European Union, 2005.
4. “Compilation of Farmer Organizations in Malawi”, Consortium for the Development of a Database for Farmers Organizations, 2005.
5. “Plan of Operation for 2006 – 2007 for Department of Agricultural Extension Services”, Department of Agricultural Extension Service, 2006.
6. “Land-care practices in Malawi”, Malawi Agro-forestry Extension Project, March 2002.
7. “Field Guide on Irrigated Agriculture for Field Assistants”, Food and Agriculture Organization, April 2001.
8. “Guide to Agricultural Production and Natural Resources Management in Malawi”, Department of Extension Services.
9. “Sweet Potato Storage, Processing and Utilization”, Department of Extension Services.
10. “Cassava storage processing and utilization, Department of Extension Services.
11. “Training guides and handouts for land resources conservation module”, Ministry of Agriculture, Irrigation and Food Security.
12. “Manual on maize production intensification technologies”, Department of Extension Services.
13. “Small Scale Farming Business Training Manual”, RIEP Project, 2007.
14. “CropWat for Windows Users Guide ver.4.2”, FAO, IIDS, October 1998

Others

1. Climate Data (21 Stations), Collected from Meteorological Department, 2007
2. Daily Rainfall Data (8 Stations), Collected from EPA Office, 2007-2008