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Feasibility Study Wad Meskin Irrigation Project
Final Report

ANNEX 12: FINANCIAL AND ECONOMIC ANALYSIS

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Annex 12

FINANCIAL AND ECONOMIC ANALYSIS

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APPENDIX 12-1		Cropping Pattern				
WAD MESKEEN IRRIGATION PROJECT						
General cropping pattern	Cropping Pattern	Yield 1	Yield 2	Yield 3	Yield 4	
	%	qt/ha	qt/ha	qt/ha	qt/ha	
Sorghum	33.3%	19.0	24.0	29.0	34.0	
Groundnuts	33.3%	24.0	27.0	31.0	34.0	
Sesame	7.1%	12.0	15.0	18.0	20.0	
Sunflower	7.1%	10.0	13.0	15.0	18.0	
Vegetables	14.2%					
Forest tree	5.0%					
Total	100.0%					
WAD MESKEEN IRRIGATION PROJECT						
Vegetables basket	Cropping Pattern	Yield 1	Yield 2	Yield 3	Yield 4	Weighed
1.0 ha	%	qt/ha	qt/ha	qt/ha	qt/ha	qt/ha
Okra	6.0%	72.0	96.0	120.0	140.0	8.40
Okra export	14.0%	72.0	96.0	120.0	140.0	19.60
Melon	6.0%	120.0	145.0	170.0	192.0	11.52
Melon export	4.0%	120.0	145.0	170.0	192.0	7.68
Cucumber	10.0%	190.0	260.0	330.0	400.0	40.00
Sweet potato	40.0%	140.0	200.0	280.0	380.0	152.00
Water melon	10.0%	190.0	220.0	250.0	290.0	29.00
Rocket	3.0%	120.0	132.0	146.0	168.0	5.04
Jewsmallow	2.0%	144.0	162.0	180.0	192.0	3.84
Purslane	5.0%	120.0	160.0	200.0	240.0	12.00
Total	100.0%					289.08

APPENDIX 12-2		PRODUCTION COSTS				
WAD MESKEEN IRRIGATION PROJECT		FINANCIAL VALUES				
Production costs	SDG /1ha	Sorghum	Groundnuts	Sesame	Sunflower	Vegetables
		SDG / ha	SDG / ha	SDG / ha	SDG / ha	SDG / ha
Land preparation		71.0	67.0	72.0	67.0	71.0
Sowing / Planting		62.0	24.0	36.0	24.0	62.0
Weeding		45.0	60.0	95.0	45.0	95.0
Fertilizer application		24.0	24.0	24.0	24.0	24.0
Irrigation Operation		71.0	45.0	72.0	45.0	71.0
Seeds		27.0	81.0	72.0	95.0	190.0
Fertilizer		240.0		144.0	144.0	143.0
Herbicides		45.0	86.0		107.0	
Water adm. Fees						
Harvest		190.0	228.0	144.0	228.0	381.0
Packaging material		48.0	88.0	48.0	52.0	48.0
Handling & Transport		15.0	20.0	15.0	12.0	14.0
TOTAL		838.0	723.0	722.0	843.0	1 099.0
Labor / man day		10.0	11.0	9.0	11.0	30.0
WAD MESKEEN IRRIGATION PROJECT		ECONOMIC VALUES				
Production costs	SDG /1ha	Sorghum	Groundnuts	Sesame	Sunflower	Vegetables
		SDG / ha	SDG / ha	SDG / ha	SDG / ha	SDG / ha
Land preparation		68.0	64.0	69.0	64.0	59.0
Sowing / Planting		62.0	24.0	36.0	24.0	62.0
Weeding		39.0	54.0	89.0	39.0	65.0
Fertilizer application		21.0	21.0	21.0	21.0	21.0
Irrigation Operation		53.0	33.0	54.0	33.0	50.0
Seeds		27.0	81.0	72.0	95.0	190.0
Fertilizer		240.0	0.0	144.0	144.0	143.0
Herbicides		45.0	86.0	0.0	107.0	0.0
Water adm. Fees		0.0	0.0	0.0	0.0	0.0
Harvest		160.0	186.0	120.0	186.0	267.0
Packaging material		48.0	88.0	48.0	52.0	48.0
Handling & Transport		15.0	20.0	15.0	12.0	14.0
TOTAL		778.0	657.0	668.0	777.0	919.0

APPENDIX 12-3		GROSS VALUE OF AGRICULTURAL PRODUCTION						
WAD MESKEEN IRRIGATION PROJECT		FINANCIAL VALUES						
Production revenue for 7 500 ha	Cropping Pattern	Cropping Pattern	Farm Gate Price	Value of agricultural production	Value of agricultural production	Value of agricultural production	Value of agricultural production	
7 500	%	ha	SDG/qt	1st Y	2nd Y	3rd Y	4th Y & following	
Sorghum	33.3%	2 497.5	62.5	2 420 040	3 056 893	3 693 746	4 330 598	
Groundnuts	33.3%	2 497.5	137.5	7 417 575	8 272 953	9 498 575	10 417 792	
Sesame	7.1%	532.5	237.5	1 365 863	1 590 169	1 908 202	2 120 225	
Sunflower	7.1%	532.5	100.0	479 250	590 138	680 929	817 114	
Okra	0.9%	63.9	100.0	408 715	544 953	681 191	794 723	
Okra export	2.0%	149.1	200.0	1 932 336	2 576 448	3 220 560	3 757 320	
Melon	0.9%	63.9	78.0	529 588	639 919	750 250	847 341	
Melon export	0.6%	42.6	130.0	598 104	722 709	847 314	956 966	
Cucumber	1.4%	106.5	32.5	589 117	806 160	1 023 203	1 240 246	
Sweet potato	5.7%	426.0	70.0	3 745 039	5 350 056	7 490 079	10 165 107	
Water melon	1.4%	106.5	17.9	323 892	375 032	426 173	494 361	
Rocket	0.4%	32.0	80.0	274 347	301 782	333 789	384 086	
Jewsmallow	0.3%	21.3	25.0	68 454	77 011	85 567	91 272	
Purslane	0.7%	53.3	364.5	2 079 967	2 773 290	3 466 612	4 159 934	
Total	95.0%	7 125.0		22 232 287	27 677 513	34 106 191	40 577 087	
Face Value for 1 ha				2 964.3	3 690.3	4 547.5	5 410.3	
WAD MESKEEN IRRIGATION PROJECT		ECONOMIC VALUES						
Production revenue for 7 500 ha	Cropping Pattern	Cropping Pattern	Farm Gate Price	Value of agricultural production	Value of agricultural production	Value of agricultural production	Value of agricultural production	
7 500	%	ha	SDG/qt	1st Y	2nd Y	3rd Y	4th Y & following	
Sorghum	33.3%	2 497.5	65.6	2 802 663	3 540 206	4 277 749	5 015 292	
Groundnuts	33.3%	2 497.5	144.4	7 788 454	8 762 010	10 060 086	11 033 643	
Sesame	7.1%	532.5	249.4	1 434 156	1 792 695	2 151 233	2 390 259	
Sunflower	7.1%	532.5	105.0	503 213	654 176	754 819	905 783	
Okra	0.9%	63.9	100.0	414 072	552 096	690 120	805 140	
Okra export	2.0%	149.1	210.0	2 028 953	2 705 270	3 381 588	3 945 186	
Melon	0.9%	63.9	78.0	538 294	650 438	762 583	861 270	
Melon export	0.6%	42.6	136.5	628 009	758 844	889 680	1 004 815	
Cucumber	1.4%	106.5	32.5	591 874	809 933	1 027 991	1 246 050	
Sweet potato	5.7%	426.0	70.0	3 757 320	5 367 600	7 514 640	10 198 440	
Water melon	1.4%	106.5	17.9	325 986	377 457	428 929	497 557	
Rocket	0.4%	32.0	80.0	276 048	303 653	335 858	386 467	
Jewsmallow	0.3%	21.3	25.0	69 012	77 639	86 265	92 016	
Purslane	0.7%	53.3	364.5	2 096 240	2 794 986	3 493 733	4 192 479	
Total	95.0%	7 125.0		23 254 292	29 147 004	35 855 274	42 574 397	
Face Value for 1 ha				3 100.6	3 886.3	4 780.7	5 676.6	

APPENDIX 12-4			PRODUCTION COSTS			
WAD MESKEEN IRRIGATION PROJECT			FINANCIAL VALUES			
Production costs for 7 500 ha	Cropping Pattern	Cropping Pattern	Production costs	Production costs	Production costs	Production costs
7 500	%	ha	1st Y	2nd Y	3rd Y	4th Y & following
Sorghum	33.3%	2 497.5	1 465 034	1 674 324	1 883 615	2 092 905
Groundnuts	33.3%	2 497.5	1 263 985	1 444 554	1 625 123	1 805 693
Sesame	7.1%	532.5	269 126	307 572	346 019	384 465
Sunflower	7.1%	532.5	314 228	359 118	404 008	448 898
Okra	0.9%	63.9	49 158	56 181	63 203	70 226
Okra export	2.0%	149.1	114 703	131 089	147 475	163 861
Melon	0.9%	63.9	49 158	56 181	63 203	70 226
Melon export	0.6%	42.6	32 772	37 454	42 136	46 817
Cucumber	1.4%	106.5	81 930	93 635	105 339	117 044
Sweet potato	5.7%	426.0	327 722	374 539	421 357	468 174
Water melon	1.4%	106.5	81 930	93 635	105 339	117 044
Rocket	0.4%	32.0	24 579	28 090	31 602	35 113
Jewsmallow	0.3%	21.3	16 386	18 727	21 068	23 409
Purslane	0.7%	53.3	40 965	46 817	52 670	58 522
Total	95.0%	7 125.0	4 131 677	4 721 916	5 312 156	5 902 395
Face Value for 1 ha		Prod Costs	550.9	629.6	708.3	787.0
WAD MESKEEN IRRIGATION PROJECT			ECONOMIC VALUES			
Production cost for 7 500 ha	Cropping Pattern	Cropping Pattern	Production costs	Production costs	Production costs	Production costs
7 500	%	ha	1st Y	2nd Y	3rd Y	4th Y & following
Sorghum	33.3%	2 497.5	1 360 139	1 554 444	1 748 750	1 943 055
Groundnuts	33.3%	2 497.5	1 148 600	1 312 686	1 476 772	1 640 858
Sesame	7.1%	532.5	248 997	284 568	320 139	355 710
Sunflower	7.1%	532.5	289 627	331 002	372 377	413 753
Okra	0.9%	63.9	41 107	46 979	52 852	58 724
Okra export	2.0%	149.1	95 916	109 618	123 321	137 023
Melon	0.9%	63.9	41 107	46 979	52 852	58 724
Melon export	0.6%	42.6	27 405	31 320	35 234	39 149
Cucumber	1.4%	106.5	68 511	78 299	88 086	97 874
Sweet potato	5.7%	426.0	274 046	313 195	352 345	391 494
Water melon	1.4%	106.5	68 511	78 299	88 086	97 874
Rocket	0.4%	32.0	20 553	23 490	26 426	29 362
Jewsmallow	0.3%	21.3	13 702	15 660	17 617	19 575
Purslane	0.7%	53.3	34 256	39 149	44 043	48 937
Total	95.0%		3 732 477	4 265 688	4 798 899	5 332 110
Face Value for 1 ha		Prod Costs	497.7	568.8	639.9	710.9

APPENDIX 12-5		Basic Items		
WAD MESKEEN IRRIGATION PROJECT				
Basic items	Implemented Project area ha	Irrigated area in service rainfed +irrig ha	Irrigated area in service double crops ha	Volumes used by farmers 5 947 m3
1	0	0		0
2	2 500	0		0
3	2 500	2 500		14 867 500
4	2 500	5 000		29 735 000
5		7 500		44 602 500
6		7 500		44 602 500
7		7 500		44 602 500
8		7 500		44 602 500
9		7 500		44 602 500
10		7 500		44 602 500
11	10 000	7 500		44 602 500
12	10 000	17 500		104 072 500
13	10 000	27 500		163 542 500
14	10 000	37 500		223 012 500
15	10 000	47 500		282 482 500
16	10 000	57 500		341 952 500
17	10 000	67 500		401 422 500
18	10 000	77 500		460 892 500
19	10 000	87 500		520 362 500
20	10 000	97 500		579 832 500
21		86 000	21 500	639 302 500
22		64 500	43 000	639 302 500
23		43 000	64 500	639 302 500
24			107 500	639 302 500
25			107 500	639 302 500
26			107 500	639 302 500
27			107 500	639 302 500
28			107 500	639 302 500
29			107 500	639 302 500
30			107 500	639 302 500
31			107 500	639 302 500
32			107 500	639 302 500
33			107 500	639 302 500
34			107 500	639 302 500
35			107 500	639 302 500
36			107 500	639 302 500
37			107 500	639 302 500
38			107 500	639 302 500
39			107 500	639 302 500
40			107 500	639 302 500
41			107 500	639 302 500
42			107 500	639 302 500
43			107 500	639 302 500
44			107 500	639 302 500
45			107 500	639 302 500
46			107 500	639 302 500
47			107 500	639 302 500
48			107 500	639 302 500
49			107 500	639 302 500
50			107 500	639 302 500
NPV				1 148 834 867

APPENDIX 12-6				Operation and Maintenance costs			
WAD MESKEEN IRRIGATION PROJECT							
O&M	Phase 1 Accumulated investments M ^e SDG	Phase 2 Accumulated investments M ^e SDG	Phase 3 Accumulated investments M ^e SDG	Phase 1 M ^e SDG	Phase 2 M ^e SDG	Phase 3 M ^e SDG	Total O&M M ^e SDG
				2%	2%	2%	
1	3.77	0.00	0.00				
2	34.26	0.00	0.00				
3	60.97	0.00	0.00	0.08	0.00	0.00	0.08
4	87.68	0.00	0.00	0.69	0.00	0.00	0.69
5	87.68	0.00	0.00	1.22	0.00	0.00	1.22
6	87.68	0.00	0.00	1.75	0.00	0.00	1.75
7	87.68	0.00	0.00	1.75	0.00	0.00	1.75
8	87.68	0.00	0.00	1.75	0.00	0.00	1.75
9	87.68	0.00	0.00	1.75	0.00	0.00	1.75
10	87.68	38.70	0.00	1.75	0.00	0.00	1.75
11	87.68	244.11	0.00	1.75	0.00	0.00	1.75
12	87.68	365.84	0.00	1.75	0.77	0.00	2.53
13	87.68	466.42	0.00	1.75	4.88	0.00	6.64
14	87.68	567.00	0.00	1.75	7.32	0.00	9.07
15	87.68	700.33	0.00	1.75	9.33	0.00	11.08
16	87.68	800.91	0.00	1.75	11.34	0.00	13.09
17	87.68	922.64	0.00	1.75	14.01	0.00	15.76
18	87.68	1 038.89	0.00	1.75	16.02	0.00	17.77
19	87.68	1 139.47	49.53	1.75	18.45	0.00	20.21
20	87.68	1 240.05	93.18	1.75	20.78	0.00	22.53
21	87.68	1 240.05	101.58	1.75	22.79	0.99	25.53
22	87.68	1 240.05	104.11	1.75	24.80	1.86	28.42
23	87.68	1 240.05	106.63	1.75	24.80	2.03	28.59
24	87.68	1 240.05	106.63	1.75	24.80	2.08	28.64
25	87.68	1 240.05	106.63	1.75	24.80	2.13	28.69
26	87.68	1 240.05	106.63	1.75	24.80	2.13	28.69
27	87.68	1 240.05	106.63	1.75	24.80	2.13	28.69
28	87.68	1 240.05	106.63	1.75	24.80	2.13	28.69
29	87.68	1 240.05	106.63	1.75	24.80	2.13	28.69
30	87.68	1 240.05	106.63	1.75	24.80	2.13	28.69
31	87.68	1 240.05	106.63	1.75	24.80	2.13	28.69
32	87.68	1 240.05	106.63	1.75	24.80	2.13	28.69
33	87.68	1 240.05	106.63	1.75	24.80	2.13	28.69
34	87.68	1 240.05	106.63	1.75	24.80	2.13	28.69
35	87.68	1 240.05	106.63	1.75	24.80	2.13	28.69
36	87.68	1 240.05	106.63	1.75	24.80	2.13	28.69
37	87.68	1 240.05	106.63	1.75	24.80	2.13	28.69
38	87.68	1 240.05	106.63	1.75	24.80	2.13	28.69
39	87.68	1 240.05	106.63	1.75	24.80	2.13	28.69
40	87.68	1 240.05	106.63	1.75	24.80	2.13	28.69
41	87.68	1 240.05	106.63	1.75	24.80	2.13	28.69
42	87.68	1 240.05	106.63	1.75	24.80	2.13	28.69
43	87.68	1 240.05	106.63	1.75	24.80	2.13	28.69
44	87.68	1 240.05	106.63	1.75	24.80	2.13	28.69
45	87.68	1 240.05	106.63	1.75	24.80	2.13	28.69
46	87.68	1 240.05	106.63	1.75	24.80	2.13	28.69
47	87.68	1 240.05	106.63	1.75	24.80	2.13	28.69
48	87.68	1 240.05	106.63	1.75	24.80	2.13	28.69
49	87.68	1 240.05	106.63	1.75	24.80	2.13	28.69
50	87.68	1 240.05	106.63	1.75	24.80	2.13	28.69
Total							

APPENDIX 12-7		GROSS PROFITS						
WAD MESKEEN IRRIGATION PROJECT				FINANCIAL VALUES				
Production profits	Irrigated area in service rainfed +irrig	Irrigated area in service double crops	Value of agriculture production / ha Phase1	Value of agriculture production / ha Phase2	Production costs / ha Phase1	Production costs / ha Phase2	Livestock Profits	Total gross profits
	ha	ha	SDG	SDG	SDG	SDG	SDG	SDG
1	0		0		0		0	0
2	0		0		0		0	0
3	2 500		7 410 762		1 377 226		12 644	6 046 181
4	5 000		16 636 600		2 951 198		37 933	13 723 335
5	7 500		28 005 330		4 721 916		75 865	23 359 280
6	7 500		34 120 263		5 312 156		94 832	28 902 940
7	7 500		38 420 122		5 705 649		94 832	32 809 305
8	7 500		40 577 087		5 902 395		94 832	34 769 524
9	7 500		40 577 087		5 902 395		94 832	34 769 524
10	7 500		40 577 087		5 902 395		94 832	34 769 524
11	7 500		40 577 087		5 902 395		94 832	34 769 524
12	17 500		70 220 137		11 411 297		221 274	59 030 114
13	27 500		107 123 487		17 707 185		347 716	89 764 018
14	37 500		152 598 408		24 790 059		474 156	128 282 507
15	47 500		206 701 190		32 659 919		600 601	174 641 872
16	57 500		260 803 973		40 529 779		727 043	221 001 237
17	67 500		314 906 756		48 399 639		853 485	267 360 602
18	77 500		369 009 538		56 269 499		979 928	313 719 967
19	87 500		423 112 321		64 139 359		1 106 370	360 079 332
20	97 500		477 215 103		72 009 219		1 232 812	406 438 696
21	86 000	21 500	531 317 886	38 239 534	79 879 079	9 475 311	1 359 254	481 562 284
22	64 500	43 000	555 777 619	76 479 068	82 240 037	18 950 623	1 359 254	532 425 282
23	43 000	64 500	572 977 052	114 718 602	83 814 009	36 547 630	1 359 254	568 693 269
24	0	107 500	756 086 387	814 246 878		152 853 820	1 359 254	604 591 821
25	0	107 500	814 246 878			152 853 820	1 359 254	662 752 313
26	0	107 500	814 246 878			152 853 820	1 359 254	662 752 313
27	0	107 500	814 246 878			152 853 820	1 359 254	662 752 313
28	0	107 500	814 246 878			152 853 820	1 359 254	662 752 313
29	0	107 500	814 246 878			152 853 820	1 359 254	662 752 313
30	0	107 500	814 246 878			152 853 820	1 359 254	662 752 313
31	0	107 500	814 246 878			152 853 820	1 359 254	662 752 313
32	0	107 500	814 246 878			152 853 820	1 359 254	662 752 313
33	0	107 500	814 246 878			152 853 820	1 359 254	662 752 313
34	0	107 500	814 246 878			152 853 820	1 359 254	662 752 313
35	0	107 500	814 246 878			152 853 820	1 359 254	662 752 313
36	0	107 500	814 246 878			152 853 820	1 359 254	662 752 313
37	0	107 500	814 246 878			152 853 820	1 359 254	662 752 313
38	0	107 500	814 246 878			152 853 820	1 359 254	662 752 313
39	0	107 500	814 246 878			152 853 820	1 359 254	662 752 313
40	0	107 500	814 246 878			152 853 820	1 359 254	662 752 313
41	0	107 500	814 246 878			152 853 820	1 359 254	662 752 313
42	0	107 500	814 246 878			152 853 820	1 359 254	662 752 313
43	0	107 500	814 246 878			152 853 820	1 359 254	662 752 313
44	0	107 500	814 246 878			152 853 820	1 359 254	662 752 313
45	0	107 500	814 246 878			152 853 820	1 359 254	662 752 313
46	0	107 500	814 246 878			152 853 820	1 359 254	662 752 313
47	0	107 500	814 246 878			152 853 820	1 359 254	662 752 313
48	0	107 500	814 246 878			152 853 820	1 359 254	662 752 313
49	0	107 500	814 246 878			152 853 820	1 359 254	662 752 313
50	0	107 500	814 246 878			152 853 820	1 359 254	662 752 313
Total								

APPENDIX 12-8				RESULTS CASH FLOW - F-IRR			
WAD MESKEEN IRRIGATION PROJECT							
Cash Flow	Total Investments M° SDG	Total O&M Costs M° SDG	Total Project Costs M° SDG	Total Gross Profit M°SDG	CASHFLOW M°SDG	F-IRR %	NPV 12%
1	3.77	0.00	3.77	0.00	-3.77	27.68%	548.7
2	30.49	0.00	30.49	0.00	-30.49		
3	26.71	0.08	26.79	6.05	-20.74		
4	26.71	0.69	27.40	13.72	-13.67		
5	0.00	1.22	1.22	23.36	22.14		
6	0.00	1.75	1.75	28.90	27.15		
7	0.00	1.75	1.75	32.81	31.06		
8	0.00	1.75	1.75	34.77	33.02		
9	0.00	1.75	1.75	34.77	33.02		
10	38.70	1.75	40.45	34.77	-5.68		
11	205.41	1.75	207.16	34.77	-172.39		
12	121.73	2.53	124.26	59.03	-65.23		
13	100.58	6.64	107.22	89.76	-17.45		
14	100.58	9.07	109.65	128.28	18.63		
15	133.33	11.08	144.42	174.64	30.23		
16	100.58	13.09	113.67	221.00	107.33		
17	121.73	15.76	137.49	267.36	129.87		
18	116.25	17.77	134.02	313.72	179.70		
19	150.11	20.21	170.31	360.08	189.77		
20	144.23	22.53	166.76	406.44	239.68		
21	8.40	25.53	33.93	481.56	447.63		
22	2.53	28.42	30.94	532.43	501.48		
23	2.53	28.59	31.11	568.69	537.58		
24		28.64	28.64	604.59	575.96		
25		28.69	28.69	662.75	634.07		
26		28.69	28.69	662.75	634.07		
27		28.69	28.69	662.75	634.07		
28		28.69	28.69	662.75	634.07		
29		28.69	28.69	662.75	634.07		
30		28.69	28.69	662.75	634.07		
31		28.69	28.69	662.75	634.07		
32		28.69	28.69	662.75	634.07		
33		28.69	28.69	662.75	634.07		
34		28.69	28.69	662.75	634.07		
35		28.69	28.69	662.75	634.07		
36		28.69	28.69	662.75	634.07		
37		28.69	28.69	662.75	634.07		
38		28.69	28.69	662.75	634.07		
39		28.69	28.69	662.75	634.07		
40		28.69	28.69	662.75	634.07		
41		28.69	28.69	662.75	634.07		
42		28.69	28.69	662.75	634.07		
43		28.69	28.69	662.75	634.07		
44		28.69	28.69	662.75	634.07		
45		28.69	28.69	662.75	634.07		
46		28.69	28.69	662.75	634.07		
47		28.69	28.69	662.75	634.07		
48		28.69	28.69	662.75	634.07		
49		28.69	28.69	662.75	634.07		
50		28.69	28.69	662.75	634.07		
Total	1 434.36						
NPV	317.21	46.38	363.59	912.26	548.67		
m ³	0.28	0.04	0.32				
B/C				2.51			

APPENDIX 12-9 RESULTS CASH FLOW E-IRR							
WAD MESKEEN IRRIGATION PROJECT							
Cash Flow	Total Investments	Total O&M Costs	Total Project Costs	Total Gross Profit	CASHFLOW	EIRR	NPV
	M° SDG	M° SDG	M° SDG	M°SDG	M°SDG	%	12%
1	3.43	0.00	3.43	0.00	-3.43	32.1%	645.1
2	27.74	0.00	27.74	0.00	-27.74		
3	24.31	0.07	24.38	6.52	-17.86		
4	24.31	0.62	24.93	14.84	-10.09		
5	0.00	1.11	1.11	25.23	24.12		
6	0.00	1.60	1.60	31.15	29.56		
7	0.00	1.60	1.60	35.28	33.68		
8	0.00	1.60	1.60	37.34	35.74		
9	0.00	1.60	1.60	37.34	35.74		
10	35.22	1.60	36.81	37.34	0.52		
11	186.92	1.60	188.52	37.34	-151.18		
12	110.77	2.30	113.07	63.49	-49.58		
13	91.53	6.04	97.57	96.79	-0.77		
14	91.53	8.25	99.78	138.33	38.55		
15	121.33	10.08	131.42	188.11	56.69		
16	91.53	11.92	103.44	237.89	134.45		
17	110.77	14.34	125.12	287.68	162.56		
18	105.78	16.17	121.96	337.46	215.50		
19	136.60	18.39	154.98	387.24	232.26		
20	131.25	20.50	151.75	437.03	285.27		
21	7.65	23.24	30.88	518.25	487.37		
22	2.30	25.86	28.16	573.31	545.15		
23	2.30	26.01	28.31	613.89	585.58		
24		26.06	26.06	641.81	615.75		
25		26.11	26.11	702.83	676.73		
26		26.11	26.11	702.83	676.73		
27		26.11	26.11	702.83	676.73		
28		26.11	26.11	702.83	676.73		
29		26.11	26.11	702.83	676.73		
30		26.11	26.11	702.83	676.73		
31		26.11	26.11	702.83	676.73		
32		26.11	26.11	702.83	676.73		
33		26.11	26.11	702.83	676.73		
34		26.11	26.11	702.83	676.73		
35		26.11	26.11	702.83	676.73		
36		26.11	26.11	702.83	676.73		
37		26.11	26.11	702.83	676.73		
38		26.11	26.11	702.83	676.73		
39		26.11	26.11	702.83	676.73		
40		26.11	26.11	702.83	676.73		
41		26.11	26.11	702.83	676.73		
42		26.11	26.11	702.83	676.73		
43		26.11	26.11	702.83	676.73		
44		26.11	26.11	702.83	676.73		
45		26.11	26.11	702.83	676.73		
46		26.11	26.11	702.83	676.73		
47		26.11	26.11	702.83	676.73		
48		26.11	26.11	702.83	676.73		
49		26.11	26.11	702.83	676.73		
50		26.11	26.11	702.83	676.73		
Total	1 305.27						
NPV	288.66	42.20	330.87	975.96	645.10		
m³	0.25	0.04	0.29				
B/C				2.95			

APPENDIX 12-10 GROSS PROFIT FOR MODEL FARM												
WAD MESKEEN IRRIGATION PROJECT			FINANCIAL VALUES									
Gross profit for 12.6 ha	Cropping Pattern	Cropping Pattern	YIELDS usable=90%	Production for 12.6 ha	Food requirement	Gross tradable production	Farm gate price	Value of agricultural production	Production costs	Production costs for 12.6 ha	Gross profit for 12.6 ha	
12.6 ha	%	ha	qt/ha	qt	qt	qt	SDG/qt	SDG	SDG/ha	SDG	SDG	
Sorghum	33.3%	4.20	30.6	128.4	11.99	116.41	56.3	6 547.9	892.0	3 742.7	2 805.2	
Groundnuts	33.3%	4.20	30.6	128.4	1.11	127.29	123.8	15 751.7	761.3	3 194.1	12 557.6	
Sesame	7.1%	0.89	18.0	16.1	1.11	15.00	213.8	3 205.8	761.6	681.3	2 524.5	
Sunflower	7.1%	0.89	16.2	14.5	0.77	13.73	90.0	1 235.5	902.7	807.6	427.9	
Okra	0.9%	0.11	126.0	13.5	0.18	13.35	90.0	1 201.6	1 156.2	124.1	1 077.5	
Okra export	2.0%	0.25	126.0	31.6		31.56	160.0	5 049.8	1 156.2	289.6	4 760.2	
Melon	0.9%	0.11	172.8	18.6	0.30	18.25	70.2	1 281.2	1 156.2	124.1	1 157.1	
Melon export	0.6%	0.07	172.8	12.4		12.37	104.0	1 286.2	1 156.2	82.7	1 203.4	
Cucumber	1.4%	0.18	360.0	64.4	0.30	64.11	29.3	1 875.3	1 156.2	206.9	1 668.4	
Sweet potato	5.7%	0.72	342.0	244.8	0.80	243.96	63.0	15 369.6	1 156.2	827.4	14 542.2	
Water melon	1.4%	0.18	261.0	46.7	0.30	46.40	16.1	747.5	1 156.2	206.9	540.6	
Rocket	0.4%	0.05	151.2	8.1	0.05	8.07	72.0	580.7	1 156.2	62.1	518.7	
Jewsmallow	0.3%	0.04	172.8	6.2	0.05	6.13	22.5	138.0	1 156.2	41.4	96.6	
Purslane	0.7%	0.09	216.0	19.3	0.15	19.17	328.1	6 289.8	1 156.2	103.4	6 186.4	
Total	95.0%	11.97		752.9	17.09	735.79	1 438.86	60 560.56	14 879.05	10 494.17	50 066.4	

APPENDIX 12-11		FINANCIAL ANALYSIS - Detail of Yields			
WAD MESKEEN IRRIGATION PROJECT					
Financial Analysis YIELDS	Yield 4	YIELDS usable=90%	Part of tradable production	Tradable Yields	
	qt/ha	qt/ha		qt/ha	
Sorghum	34.0	30.6	0.907	27.744	
Groundnuts	34.0	30.6	0.991	30.337	
Sesame	20.0	18.0	0.931	16.765	
Sunflower	18.0	16.2	0.947	15.345	
Okra	140.0	126.0	0.987	124.370	
Okra export	140.0	126.0	1.000	126.000	
Melon	192.0	172.8	0.984	170.005	
Melon export	192.0	172.8	1.000	172.800	
Cucumber	400.0	360.0	0.995	358.323	
Sweet potato	380.0	342.0	0.997	340.882	
Water melon	290.0	261.0	0.994	259.323	
Rocket	168.0	151.2	0.994	150.268	
Jewsmallow	192.0	172.8	0.992	171.403	
Purslane	240.0	216.0	0.992	214.323	
Part of tradable volume = usable Yields minus the household food requirements					

Appendix 12-12: Results of financial analysis with proportional costs for 7,500 ha.

Years	Total Investments	Total O&M Costs	Total Project Costs	Total Gross Profit	CASHFLOW	F-IRR	NPV
	M° SDG	M° SDG	M° SDG	M°SDG	M°SDG	12%	12%
1	3,77	0,00	3,77	0,00	-3,77	27,71%	92,5
2	30,49	0,00	30,49	0,00	-30,49	27,67%	
3	26,71	0,08	26,79	6,05	-20,74		
4	26,71	0,69	27,40	13,72	-13,67		
5	0,00	1,22	1,22	23,36	22,14		
6	0,00	1,75	1,75	28,90	27,15		
7	0,00	1,75	1,75	32,81	31,06		
8	0,00	1,75	1,75	34,77	33,02		
9	0,00	1,75	1,75	34,77	33,02		
10	2,70	1,75	4,45	34,77	30,32		
11	14,33	1,75	16,09	34,77	18,68		
12	8,49	1,81	10,30	34,77	24,47		
13	7,02	2,09	9,11	34,77	25,66		
14	7,02	2,26	9,28	34,77	25,49		
15	9,30	2,40	11,71	34,77	23,06		
16	7,02	2,54	9,56	34,77	25,21		
17	8,49	2,73	11,22	34,77	23,55		
18	8,11	2,87	10,98	34,77	23,79		
19	10,47	3,04	13,51	34,77	21,26		
20	10,06	3,20	13,27	34,77	21,50		
21	0,59	3,41	4,00	34,77	30,77		
22	0,18	3,61	3,79	34,77	30,98		
23	0,18	3,63	3,80	34,77	30,97		
24		3,63	3,63	34,77	31,14		
25		3,63	3,63	34,77	31,14		
26		3,63	3,63	34,77	31,14		
27		3,63	3,63	34,77	31,14		
28		3,63	3,63	34,77	31,14		
29		3,63	3,63	34,77	31,14		
30		3,63	3,63	34,77	31,14		
31		3,63	3,63	34,77	31,14		
32		3,63	3,63	34,77	31,14		
33		3,63	3,63	34,77	31,14		
34		3,63	3,63	34,77	31,14		
35		3,63	3,63	34,77	31,14		
36		3,63	3,63	34,77	31,14		
37		3,63	3,63	34,77	31,14		
38		3,63	3,63	34,77	31,14		
39		3,63	3,63	34,77	31,14		
40		3,63	3,63	34,77	31,14		
41		3,63	3,63	34,77	31,14		
42		3,63	3,63	34,77	31,14		
43		3,63	3,63	34,77	31,14		
44		3,63	3,63	34,77	31,14		
45		3,63	3,63	34,77	31,14		
46		3,63	3,63	34,77	31,14		
47		3,63	3,63	34,77	31,14		
48		3,63	3,63	34,77	31,14		
49		3,63	3,63	34,77	31,14		
50		3,63	3,63	34,77	31,14		
Total	181,64						
NPV	81,35	12,00	93,35	185,83	92,48		
m ³	0,31	0,05	0,35				
B/C				1,99			