

4. Pumping test data and results

DRILLING AND DAM CONSTRUCTION AGENCY

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DAR ES SALAAM.

23rd April, 2001

**OVERSEAS OPERATION DEPARTMENT,
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- *Attention: Mr. Kunio Fujiwara
Lindi / Mtwara Study Team*

**Re: PUMPING TEST DATAS IN THE STUDY OF LINDI AND MTWARA
WATER SUPPLY**

With reference to the above heading and your letter dated 27th March 2001, find enclosed herewith the pumping test datas as requested.

Remember 3 boreholes were abandoned: ie.

- a) Ndomoni – salty – above 8500 μ s
- b) Litehu – dry
- c) Mbawala – dry

In this report, Preliminary and Step draw down pumping tests are not included. Please contact us if you find it necessary.

Note: These datas are for the continuous pumping test, for seven boreholes out of ten boreholes which were drilled in Mtwara and Lindi Regions.

Yours faithfully,

Eng. M. A. Assey

ELECTRICAL ENGINEER

23-04-2001

10.

PUMP TEST FOR BOREHOLE No. LD 341/2000 CHINOGWE

Conducted for28.....Hours & Witnessed by...HAMADI HAMISI...

S.W.L.at6.80.....Metres; Yield ...3,200... litres/hr; Drawdown ...48...metres;

Outflow measured with Tank Capacity of22.....litres.

PUMP TEST METHOD

Air lift size inches; Placed at depth ofmetres.

Pump Cylinder size.....inches; Placed at depth of.....metres.

Submersible pump size.....4..... inches; Placed at depth of.....58..... metres.

WATER LEVEL DRAWDOWN (B.G.L.)

Date	Time		DWL		Yield LPH	Date	Time		DWL		Yield LPH	Remarks (Water Appearance, Test interrupted.Etc.)
	hrs	min	m	cm			hrs	min	m	cm		
5.10.2000		0	6	80				880	53	03	3200	
		1	10	51	3200			940	53	16	3200	
		2	12	54	3200			1000	53	19	3200	
		3	14	55	3200			1060	53	39	3200	
		4	16	35	3200			1120	53	41	3200	
		6	18	37	3200			1180	53	61	3200	
		8	20	02	3200			1240	53	91	3200	
		10	21	07	3200			1300	54	80	3200	
		15	24	02	3200			1360	54	80	3200	
		20	27	13	3200			1420	54	80	3200	
		40	29	23	3200			1480	54	80	3200	
		60	32	24	3200			1540	54	80	3200	
		80	34	34	3200			1600	54	80	3200	
		100	36	56	3200			1680	54	80	3200	
		130	38	78	3200							
		160	40	89	3200							
		190	42	84	3200							
		220	44	11	3200							
		280	45	22	3200							
		340	47	23	3200							
		400	48	33	3200							
		460	49	43	3200							
		520	50	43	3200							
		580	52	43	3200							
		640	52	54	3200							
		700	52	65	3200							
		760	52	77	3200							
		820	52	89	3200							

10. PUMP TEST BOREHOLE No. LD. 339/2000 KILWA PANDE

Conducted for27.....Hours & Witnessed by...HAMADI HAMISI

S.W.L.at28.....Metres; Yield ...31,680... litres/hr; Drawdown ...2.57.....metres;

Outflow measured with Tank Capacity of22.....litres.

PUMP TEST METHOD

Air lift size inches; Placed at depth ofmetres.

Pump Cylinder size.....inches; Placed at depth of.....metres.

Submersible pump size...4..... inches; Placed at depth of.....70.50..... metres.

WATER LEVEL DRAWDOWN (B.G.L.)

Date	Time		DWL		Yield LPH	Date	Time		DWL		Yield LPH	Remarks (Water Appearance, Test interrupted.Etc.)
	hrs	min	m	cm			hrs	min	m	cm		
9.10.2001		0	28	00			600	30	57	31,680		
		1	32	20	31,680		660	30	57	"		
		2	30	08	"		720	30	57	"		
		3	30	12	"		780	30	57	"		
		4	30	15	"		840	30	57	"		
		6	30	25	"		900	30	57	"		
		8	30	25	"		960	30	57	"		
		10	30	27	"		1020	30	57	"		
		20	30	40	"		1080	30	57	"		
		30	30	42	"		1140	30	57	"		
		40	30	45	"		1200	30	57	"		
		50	30	47	"		1260	30	57	"		
		50	30	50	"		1320	30	57	"		
		60	30	52	"		1380	30	78	"		
		75	30	53	"		1440	30	59	"		
		90	30	54	"		1500	30	57	"		
		105	30	55	31,680		1560	30	57	"		
		120	30	57	31,680		1620	30	57	31,680		
		150	30	57	"							
		180	30	57	"							
		210	30	57	"							
		240	30	57	"							
		270	30	57	"							
		300	30	57	31,680							
		360	30	57	"							
		420	30	57	"							
		480	30	57	"							
		540	30	57	31,680							

10. PUMP TEST BOREHOLE No. LD 338/2000 KILANGALA

Conducted for28.....Hours & Witnessed by.....HAMADI HAMISI

S.W.L.at ...O VER FLOW Metres; Yield3960 litres/hr; Drawdown ...58.4. metres;

Outflow measured with Tank Capacity of22.....litres.

PUMP TEST METHOD

Air lift size inches; Placed at depth ofmetres.

Pump Cylinder size.....inches; Placed at depth of.....metres.

Submersible pump size... 4" inches; Placed at depth of.....72..... metres.

WATER LEVEL DRAWDOWN (B.G.L.)

Date	Time		DWL		Yield LPH	Date	Time		DWL		Yield LPH	Remarks (Water Appearance, Test interrupted.Etc.)
	hrs	min	m	cm			hrs	min	m	cm		
8.10.2000		0	0	0		8.10.2000		540	57	66	3960	
		1	6	75	3960			600	57	86	3960	
		2	13	50	3960			660	57	96	3960	
		3	20	25	3960			720	58	07	3960	
		4	26	80	3960			780	58	18	3960	
		6	33	80	3960			840	58	29	3960	
		8	36	57	3960			900	58	33	3960	
		10	38	45	3960			960	58	40	3960	
		15	40	46	3960			1020	58	40	3960	
		20	41	54	3960			1080	58	40	3960	
		30	43	61	3960			1140	58	40	3960	
		40	45	05	3960			1200	58	40	3960	
		50	46	08	3960			1260	58	40	3960	
		60	47	10	3960			1320	58	40	3960	
		75	48	12	3960			1380	58	40	3960	
		90	49	14	3960			1320	58	40	3960	
		105	50	16	3960			1380	58	40	3960	
		120	51	18	3960			1440	58	40	3960	
		140	52	21	3960			1500	58	40	3960	
		160	53	23	3960			1620	58	40	3960	
		180	54	24	3960			1680	58	40	3960	
		210	55	24	3960							
		240	56	74	3960							
		270	57	76	3960							
		300	57	06	3960							
		360	57	26	3960							
		420	57	46	3960							
		480	57	56	3960							

10.

PUMP TEST - BOREHOLE No. MT 338/2000 ARUSHA CHINI

Conducted for28.....Hours & Witnessed by...HAMADI HAMISI

S.W.L.at ...12.19 overflow ...Metres; 25,000... litres/hr; Drawdown ...40.21....metres;

Outflow measured with Tank Capacity of220.....litres.

PUMP TEST METHOD

Air lift size inches; Placed at depth ofmetres.

Pump Cylinder size.....inches; Placed at depth of.....metres.

Submersible pump size.....4..... inches; Placed at depth of.....80..... metres.

WATER LEVEL DRAWDOWN (B.G.L.)

Date	Time		DWL		Yield LPH	Date	Time		DWL		Yield LPH	Remarks (Water Appearance, Test interrupted.Etc.)
	hrs	min	m	cm			hrs	min	m	cm		
6.9.2000		0	12	19				540	51	80	25,000	
		1	14	67	25,000			600	51	98	25,000	
		2	16	86	25,000			660	52	17	25,000	
		3	18	12	25,000			720	52	36	25,000	
		4	20	41	25,000			780	52	38	25,000	
		6	23	79	25,000			840	52	39	25,000	
		8	25	89	25,000			900	52	40	25,000	
		10	27	92	25,000			960	52	40	25,000	
		15	31	93	25,000			1020	52	40	25,000	
		20	35	77	25,000			1080	52	40	25,000	
		25	38	02	25,000			1140	52	40	25,000	
		30	41	72	25,000			1200	52	40	25,000	
		40	45	67	25,000			1260	52	40	25,000	
		50	49	08	25,000			1320	52	40	25,000	
		60	50	06	25,000			1380	52	40	25,000	
		75	50	15	25,000			1320	52	40	25,000	
		90	50	26	25,000			1380	52	40	25,000	
		105	50	37	25,000			1440	52	40	25,000	
		120	50	49	25,000			1500	52	40	25,000	
		140	50	60	25,000			1620	52	40	25,000	
		160	50	72	25,000			1680	52	40	25,000	
		180	50	81	25,000							
		210	50	86	25,000							
		240	50	99	25,000							
		300	51	15	25,000							
		360	51	31	25,000							
		420	51	47	25,000							
		460	51	63	25,000							

11. WATER LEVEL RECOVERY (B.G.L.)

Date	Time		Water level rose to:		Date	Time		Water level rose to:		Additional Notes
	hrs	min	m	cm		hrs	min	m	cm	
7/9/2000		0	52	40			160	16	02	
		1	46	66			180	15	72	
		2	38	40			210	15	60	
		3	30	48			240	15	48	
		4	26	67			300	15	21	
		6	20	11			360	14	80	
		8	19	65			420	14	45	
		10	19	33			480	14	20	
		15	19	10			540	14	04	
		20	18	92			600	13	98	
		25	18	76						
		30	18	60						
		40	18	50						
		50	18	10						
		60	17	90						
		75	17	50						
		90	17	30						
		105	17	11						
		120	16	80						
		140	16	37						

10. PUMP TEST BOREHOLE No. LD 337/2000 MNOLELA

Conducted for24.....Hours & Witnessed by ENG.M.A.ASSEY

S.W.L.at ...65.08..... Metres; Yield500...litres/hr; Drawdown ...22.48....metres;

Outflow measured with Tank Capacity of22.....litres.

PUMP TEST METHOD

Air lift size inches; Placed at depth ofmetres.

Pump Cylinder size.....inches; Placed at depth of.....metres.

Submersible pump size.....4.....inches; Placed at depth of.....90..... metres.

WATER LEVEL DRAWDOWN (B.G.L.)

Date	Time		DWL		Yield LPH	Date	Time		DWL		Yield LPH	Remarks (Water Appearance, Test interrupted.Etc.)
	hrs	min	m	cm			hrs	min	m	cm		
5.9.2000		0	65	08				540	87	01	500	
		1	65	50	500	6/9/2000		600	86	99	500	
		2	65	78	500			660	87	12	500	
		3	66	02	500			720	87	50	500	
		4	66	24	500			780	87	92	500	
		6	66	57	500			840	88	30	500	
		8	66	98	500			900	88	67	500	
		10	67	33	500			960	88	50	500	
		15	68	05	500			1020	88	07	500	
		20	68	81	500			1080	87	70	500	
		25	69	16	500			1140	87	56	500	
		30	69	83	500			1200	87	56	500	
		40	71	12	500			1260	87	56	500	
		50	73	08	500			1320	87	56	500	
		60	74	61	500			1380	87	58	500	
		75	76	43	500			1440	87	56	500	
		90	78	64	500							
		105	79	14	500							
		120	79	77	500							
		140	80	36	500							
		160	81	02	500							
		180	81	70	500							
		210	82	90	500							
		240	83	98	500							
		300	87	20	500							
		360	87	40	500							
		420	86	90	500							
		480	87	10	500							

11. WATER LEVEL RECOVERY (B.G.L.)

Date	Time		Water level rose to:		Date	Time		Water level rose to:		Additional Notes
	hrs	min	m	cm		hrs	min	m	cm	
6.09.2000		0	87	56			160	71	07	
		1	86	93			180	70	85	
		2	86	33			210	70	80	
		3	85	83			240	70	62	
		4	85	37			300	70	50	
		6	84	94			360	70	38	
		8	84	31			420	70	29	
		10	83	70			480	70	11	
		15	81	63			540	69	01	
		20	79	88			600	68	91	
		25	78	61						
		30	76	83						
		40	75	67						
		50	75	05						
		60	74	50						
		75	73	81						
		90	73	18						
		105	72	63						
		120	72	13						
		140	71	53						

10.

PUMP TEST BOREHOLE No. MT 336/2000 NANYUMBU

Conducted for28.....Hours & Witnessed by.....HAMADI HAMISI

S.W.L.at4.76.....Metres; Yield ...6300..... litres/hr; Drawdown ...53.22....metres;

Outflow measured with Tank Capacity of22.....litres.

PUMP TEST METHOD

Air lift size inches; Placed at depth ofmetres.

Pump Cylinder size.....inches; Placed at depth of.....metres.

Submersible pump size.....4..... inches; Placed at depth of.....70.....metres.

WATER LEVEL DRAWDOWN (B.G.L.)

Date	Time		DWL		Yield LPH	Date	Time		DWL		Yield LPH	Remarks (Water Appearance, Test interrupted.Etc.)
	hrs	min	m	cm			hrs	min	m	cm		
10.9.000		0	4	76				540	57	86	6300	
		1	15	63	6300			600	57	92	6300	
		2	22	30	6300			660	57	96	6300	
		3	30	20	6300			720	57	98	6300	
		4	38	76	6300			780	57	98	6300	
		6	40	35	6300			840	57	98	6300	
		8	45	71	6300			900	57	98	6300	
		10	48	08	6300			960	57	98	6300	
		15	50	06	6300			1020	57	98	6300	
		20	52	58	6300			1080	57	98	6300	
		25	53	29	6300			1140	57	98	6300	
		30	54	08	6300			1200	57	98	6300	
		40	55	12	6300			1260	57	98	6300	
		50	55	58	6300			1320	57	98	6300	
		60	55	92	6300			1380	57	98	6300	
		75	56	07	6300			1440	57	98	6300	
		90	56	17	6300			1500	57	98	6300	
		105	56	26	6300			1560	57	98	6300	
		120	56	34	6300			1620	57	98	6300	
		140	56	43	6300			1680	57	98	6300	
		160	56	50	6300							
		180	56	61	63.00							
		210	56	72	63.00							
		240	56	83	63.00							
		300	57	04	63.00							
		360	57	28	63.00							
		420	57	49	63.00							
		480	57	70	63.00							

10. PUMP TEST BOREHOLE No. MT.332/2000 ZIWANI

Conducted for 34.....Hours & Witnessed by...HAMADI HAMISI

S.W.L.at40.88.....Metres; Yield ...27.000... litres/hr; Drawdown...2.42.....metres;

Outflow measured with Tank Capacity of220..... litres.

PUMP TEST METHOD

Air lift size inches; Placed at depth ofmetres.

Pump Cylinder size.....inches; Placed at depth of.....metres.

Submersible pump size.....4”.....inches; Placed at depth of.....62.50..... metres.

WATER LEVEL DRAWDOWN (B.G.L.)

Date	Time		DWL		Yield LPH	Date	Time		DWL		Yield LPH	Remarks (Water Appearance, Test interrupted.Etc.)
	hrs	min	m	cm			hrs	min	m	cm		
18.9.2001		0	40	88				540	43	30	27.000	
		1	43	46	27.000			600	43	30	27.000	
		2	43	38	27.000			660	43	30	27.000	
		3	43	38	27.000			720	43	30	27.000	
		4	43	30	27.000			780	43	30	27.000	
		6	43	30	27.000			840	43	30	27.000	
		8	43	30	27.000			900	43	30	27.000	
		10	43	30	27.000			960	43	30	27.000	
		15	43	30	27.000			1020	43	30	27.000	
		20	43	30	27.000			1080	43	30	27.000	
		25	43	30	27.000			1140	43	30	27.000	
		30	43	30	27.000			1200	43	30	27.000	
		40	43	30	27.000			1260	43	30	27.000	
		50	43	30	27.000			1320	43	30	27.000	
		60	43	30	27.000			1380	43	30	27.000	
		75	43	30	27.000			1320	43	30	27.000	
		90	43	30	27.000			1380	43	30	27.000	
		105	43	30	27.000			1440	43	30	27.000	
		120	43	30	27.000			1500	43	30	27.000	
		140	43	30	27.000			1620	43	30	27.000	
		160	43	30	27.000			1680	43	30	27.000	
		180	43	30	27.000			1720	43	30	27.000	
		210	43	30	27.000			1740	43	30	27.000	
		240	43	30	27.000			1800	43	30	27.000	
		300	43	30	27.000			1860	43	30	27.000	
		360	43	30	27.000			1920	43	30	27.000	
		420	43	30	27.000			1980	43	30	27.000	
		480	43	30	27.000			2040	43	30	27.000	

5. Water quality test data

Water Quality Test Data (2000)

(1/18)

Sample No.	1	2	3	4	5	6	7	8	9
District	Mtwara	Mtwara	Mtwara	Mtwara	Mtwara	Mtwara	Mtwara	Mtwara	Masasi
Village	Msangamku u	Msimbati	Ziwani	Kitaya	Mahurunga	Nanguruwe	Mmyawi	Mbawala	Maparagwe
Lati(Deg.-S)	-10.2265	-10.3443	-10.3457	-10.6577	-10.5402	-10.4965	-10.7097	-10.4512	-10.566
Long(Deg.-E)	40.2225	40.4308	40.2485	40.1705	40.2837	40.028	39.823	40.1073	38.8972
Date	2/16	2/16	2/16	2/17	2/17	2/17	2/18	2/18	2/21
Source	Dug well	Dug well	Dug well	Lake	Dug well	Dug well	Borehole/Tap	Dug well	Dug well
pH	---	---	7.1	8.3	6.8	7.2	7.2	7.3	7.5
Temperature(	---	---	29.1	30.8	26.3	28.8	25.2	25.9	30.4
EC(μ S/cm)	---	---	1220.0	2700.0	700.0	334.0	760.0	174.0	75.0
Coliform	y	nd	nd	y	nd	y	y	y	y
Do(mg/l)	---	---	---	---	---	---	---	---	---
Turbidity(UT	---	---	---	---	---	---	---	---	---
Na(mg/l)	322	38.7	214	476	89.5	41.8	95.7	26	12.8
K(mg/l)	23.5	25.7	16.2	45.4	13.4	11.9	10	5.4	6.1
Ca(mg/l)	0.14	0.21	nd	nd	0.13	nd	0.96	nd	0.29
Mg(mg/l)	0.83	1.1	3.87	0.13	1.15	2.07	1.91	3.72	3.84
Fe(mg/l)	0.03	0.01	0.08	0.02	0.02	0.49	0.02	0.15	0.22
Mn(mg/l)	---	---	---	---	---	---	---	---	---
F(mg/l)	0.9	0.29	0.46	0.33	0.38	nd	0.25	0.34	nd
As(mg/l)	---	---	---	---	---	---	---	---	---
HCO ₃ (mg/l)	---	---	---	---	---	---	---	---	---
SO ₄ (mg/l)	58	64	280	19	31	22	54	18	1
Cl(mg/l)	---	---	---	---	---	---	---	---	---
NO ₃ -N(mg/l)	1.1	3.7	0.1	nd	nd	2.6	nd	1.9	2.7
NH ₃ -N(mg/l)	nd	nd	nd	0.22	0.01	0.06	0.05	nd	0.05
TDS(mg/l)	880-1240	165-180	660-760	1400-1890	270-360	140-170	320-430	90-110	51-65

Water Quality Test Data (2000)

(2/18)

Sample No.	10	11	12	13	14	15	16	17	18
District	Masasi	Masasi	Masasi	Masasi	Masasi	Masasi	Masasi	Masasi	Masasi
Village	Namkungwi	Lupaso	Nanjota	Mpeta	Nayumbu	Napacho	Mkumbaru	Nanyumbu	Makongonda
Lati(Deg.-S)	-10.8745	-10.9368	-10.7967	-10.8573	-11.153	-11.1412	-10.7713	-11.153	-11.0032
Long(Deg.-E)	38.7163	38.8993	38.9772	38.936	38.4885	38.2585	38.742	38.4885	39.258
Date	2/21	2/22	2/22	2/22	2/23	2/23	2/23	2/23	2/24
Source	Dug well	Borehole	Dug well	Dug well	Dug well	Dug well	Dug well	Dug well	Dug well/tap
pH	7.1	7.2	6.5	7.1	7.5	7.2	7.1	7.2	6.1
Temperature(	32.1	28.1	28.7	28.9	28.4	30.5	29.1	28.9	28.5
EC(μ S/cm)	112.0	830.0	71.0	149.0	258.0	685.0	128.0	315.0	241.0
Coliform	y	nd	y	y	y	y	nd	nd	nd
Do(mg/l)	---	---	---	---	---	---	---	---	---
Turbidity(UT.	---	---	---	---	---	---	---	---	---
Na(mg/l)	13.09	106.2	13.15	20.4	51.6	107.9	26.7	109	39.2
K(mg/l)	4.9	5.9	3.3	4.5	13	34.4	3.8	15.5	5.5
Ca(mg/l)	0.41	0.59	0.17	0.21	nd	0.38	2.11	0.39	nd
Mg(mg/l)	2.72	0.4	2.46	3.42	1.24	2.86	1.94	2.61	2.39
Fe(mg/l)	0.23	0.02	0.63	0.74	0.02	0.28	4.00	1.41	4.80
Mn(mg/l)	---	---	---	---	---	---	---	---	---
F(mg/l)	0.2	0.44	nd	nd	0.57	0.26	nd	0.26	0.15
As(mg/l)	---	---	---	---	---	---	---	---	---
HCO ₃ (mg/l)	---	---	---	---	---	---	---	---	---
SO ₄ (mg/l)	1	nd	3	4	104	16	4	2	1
Cl(mg/l)	---	---	---	---	---	---	---	---	---
NO ₃ -N(mg/l)	0.8	0.3	1.2	1.4	nd	3.5	1.4	2.4	0.6
NH ₃ -N(mg/l)	0.03	nd	0.15	0.11	0.02	0.02	0.19	0.11	0.04
TDS(mg/l)	50-65	290-410	50-60	70-90	190	350-480	90-120	320-450	130-170

Water Quality Test Data (2000)

(3/18)

Sample No.	19	20	21	22	23	24	25	26	27
District	Masasi	Newala	Newala	Newala	Newala	Tandahimba	Tandahimba	Tandahimba	Kilwa
Village	Mihima	Mnanje	Chitandi	Mitaho	Kitangari	Mkula	Libobe	Mchichira	Somanga
Lati(Deg.-S)	-10.5195	-10.9835	-10.9295	-10.797	-10.631	-10.6102	-10.4835	-10.9043	-8.3917
Long(Deg.-E)	38.6757	38.3088	39.2288	39.1553	39.3227	39.453	39.5137	39.5663	39.2858
Date	2/24	2/28	2/29	2/29	3/1	3/3	3/3	3/4	3/10
Source	Dug well	Dug well	Spring	Borehole	Spring	Dug well	Lake	Dug well/tap	Dug well
pH	7.2	7.8	7.9	8.3	5.9	7.3	7.1	5.9	7.4
Temperature(	24.7	35.6	24.4	26.7	27.3	25.6	27.9	26.1	28.4
EC(μ S/cm)	68.0	92.0	573.0	100.0	236.0	178.0	425.0	255.0	1520.0
Coliform	y	y	nd	y	nd	y	y	nd	y
Do(mg/l)	---	---	---	---	---	---	---	---	---
Turbidity(UT.	---	---	---	---	---	---	---	---	---
Na(mg/l)	17.46	11.3	80.9	46.1	36.2	20.3	101.9	38.1	234
K(mg/l)	2.4	5.2	11.2	4	3.6	12.1	7.8	3.4	53.5
Ca(mg/l)	7.6	0.14	0.4	0.02	nd	nd	0.78	nd	0.39
Mg(mg/l)	10.55	3.34	2.54	3.28	3.94	3.3	3.58	2.81	nd
Fe(mg/l)	0.35	0.03	0.12	0.01	0.04	0.37	0.37	0.03	0.02
Mn(mg/l)	---	---	---	---	---	---	---	---	---
F(mg/l)	nd	0.16	0.35	nd	0.02	0.03	0.23	nd	0.72
As(mg/l)	---	---	---	---	---	---	---	---	---
HCO ₃ (mg/l)	---	---	---	---	---	---	---	---	---
SO ₄ (mg/l)	5	nd	1	nd	nd	7	nd	2	160
Cl(mg/l)	---	---	---	---	---	---	---	---	---
NO ₃ -N(mg/l)	0	0.5	0.1	0.4	1.1	0.3	0.4	1.2	0.1
NH ₃ -N(mg/l)	---	2.05	nd	nd	0.06	0.21	0.28	nd	nd
TDS(mg/l)	100-120	45-55	240-330	140-190	110-150	90-110	290-410	110-150	740-960

Water Quality Test Data (2000)

(4/18)

Sample No.	28	29	30	31	32	33	34	35	36
District	Kilwa	Kilwa	Kilwa	Kilwa	Lindi	Lindi	Lindi	Lindi	Lindi
Village	Mingumbi	Matandu	Tingi	Mavuji	Chikonji	Kinengene	MchingaII	Rutanmba	Nyangamara
Lati(Deg.-S)	-8.5292	-8.7185	-10.5042	-9.0622	-9.9373	-9.9735	-9.724	-9.0382	-10.4618
Long(Deg.-E)	39.176	39.2647	39.257	39.3175	39.5742	39.6268	39.7197	39.4497	39.6102
Date	3/10	3/10	3/10	3/11	3/13	3/13	3/14	3/15	3/15
Source	Borehole	River	Dug well	Dug well	Borehole	Dug well	Dug well	Borehole	Borehole/tank
pH	7.7	8.0	7.1	7.4	9.3	7.5	7.4	7.6	8.3
Temperature(	26.9	29.1	29.0	27.0	28.5	27.5	28.8	29.0	26.9
EC(μ S/cm)	1900.0	275.0	608.0	3450.0	605.0	3340.0	5210.0	2360.0	563.0
Coliform	y	y	y	---	y	y	y	y	y
Do(mg/l)	---	---	---	---	---	---	---	---	---
Turbidity(UT.	---	---	---	---	---	---	---	---	---
Na(mg/l)	269	32.7	84.5	667	140.6	356	1095	242	86.9
K(mg/l)	6.5	6.6	21.7	3.5	2.5	23.1	28.2	13.3	11
Ca(mg/l)	0.61	nd	0.04	2.12	1.35	1.37	nd	0.6	0.16
Mg(mg/l)	nd	3.14	2.06	0.82	2.98	nd	nd	4.4	3.09
Fe(mg/l)	0.01	0.67	0.05	0.01	0.02	0.01	0.01	0.01	0.01
Mn(mg/l)	---	---	---	---	---	---	---	---	---
F(mg/l)	0.26	nd	0.3	0.91	0.03	0.83	0.3	1.91	0.15
As(mg/l)	---	---	---	---	---	---	---	---	---
HCO ₃ (mg/l)	---	---	---	---	---	---	---	---	---
SO ₄ (mg/l)	165	15	55	56	26	280	560	125	8
Cl(mg/l)	---	---	---	---	---	---	---	---	---
NO ₃ -N(mg/l)	1.3	1.2	2.4	0.3	0.8	0.3	0.1	3.2	0.3
NH ₃ -N(mg/l)	0.02	0.01	nd	nd	0.02	0.02	nd	0.02	0.18
TDS(mg/l)	740-960	110-140	280-350	1730-2450	380-530	1030-1300	2990-3980	680-900	260-350

Water Quality Test Data (2000)

(5/18)

Sample No.	37	38	39	40	41	42	43	44	45
District	Lindi	Lindi	Lindi	Lindi	Lindi	Lindi	Lindi	Ruangwa	Ruangwa
Village	Mnazimmoja	Hingawali	Madangwa	Nachunyu	Kiwalala	Nyengedi	Tulieni	Mandawa	Ruangwa
Lati(Deg.-S)	-10.1148	-10.1955	-10.525	-10.1375	-10.1908	-10.2493	-10.051	-9.9048	-10.0572
Long(Deg.-E)	39.6163	39.7952	39.875	39.8898	39.5365	39.431	39.6378	39.123	38.9097
Date	3/16	3/16	3/16	3/16	3/17	3/17	3/17	3/21	3/21
Source	Borehole/tap	Dug well	Spring	Dug well	Dug well	River	Borehole	Spring/tap	Borehole
pH	7.9	5.2	7.0	7.2	6.5	7.6	7.7	6.1	6.7
Temperature(	26.9	31.6	29.1	28.3	25.3	24.6	25.3	26.3	28.0
EC(μ S/cm)	867.0	890.0	1680.0	2000.0	485.0	398.0	680.0	258.0	340.0
Coliform	---	y	y	y	y	y	nd	nd	nd
Do(mg/l)	---	---	---	---	---	---	---	7.2	---
Turbidity(UT	---	---	---	---	---	---	---	2.0	---
Na(mg/l)	27.4	130.9	137.7	203	65.2	43.4	110.2	29.3	468
K(mg/l)	11.8	25.8	11.7	12.7	22.2	9.3	10.8	2.4	19.5
Ca(mg/l)	1.11	1.01	0.09	1.76	0.09	0.4	0.72	nd	1.91
Mg(mg/l)	1.13	1.13	2.45	1	2.56	6.3	1.62	3.25	0.67
Fe(mg/l)	0.01	0.04	0.01	0.01	0.09	0.16	0.48	0.17	0.18
Mn(mg/l)	---	---	---	---	---	---	---	---	---
F(mg/l)	nd	0.11	0.82	nd	0.21	0.24	0.61	nd	1.07
As(mg/l)	---	---	---	---	---	---	---	---	---
HCO ₃ (mg/l)	---	---	---	---	---	---	---	---	---
SO ₄ (mg/l)	22	nd	120	44	43	nd	52	nd	1400
Cl(mg/l)	---	---	---	---	---	---	---	---	---
NO ₃ -N(mg/l)	0.1	0.1	0.5	3.7	7.5	0.2	0.5	0.1	0.1
NH ₃ -N(mg/l)	nd	0.25	0.03	0.01	0.12	0.01	nd	0.01	0.1
TDS(mg/l)	110-130	380-560	410-510	560-770	220-260	150-200	320-420	90-120	1900

Water Quality Test Data (2000)

(6/18)

Sample No.	46	47	48	49	50	51	52	53	54
District	Ruangwa	Ruangwa	Nachingwea	Nachingwea	Nachingwea	Nachingwea	Nachingwea	Nachingwea	Nachingwea
Village	Kitandi	Chinongwa	rain warter	Namikango	Mnero Miembeni	Rweje	Chiola	Marambo	Mkotukuyana
Lati(Deg.-S)	-10.1092	-10.4727	-10.3645	-10.195	-10.2223	-10.1328	-10.2013	-10.215	-10.3928
Long(Deg.-E)	38.93	38.916	38.7537	38.5587	38.6213	38.7702	38.8477	38.7662	38.889
Date	3/22	3/23	3/25	3/26	3/26	3/27	3/27	3/27	3/27
Source	Borehole	Dug well	Rain	Borehole/tap	Borehole	Pit	Borehole	Dug well	Borehole(solty?)
pH	6.7	6.9	7.3	7.4	6.6	7.0	6.8	6.7	6.5
Temperature(	26.7	28.0	23.4	26.0	28.1	27.0	28.1	25.4	27.6
EC(μ S/cm)	140.0	105.0	140.0	1783.0	2250.0	158.0	2750.0	2103.0	1980.0
Coliform	nd	y	nd	y	nd	nd	nd	nd	---
Do(mg/l)	3.4	---	5.7	5.3	2.7	3.0	1.7	1.3	2.6
Turbidity(UT	---	---	0.0	4.0	4.0	385.0	65.0	4.0	2.0
Na(mg/l)	104.5	11.02	0.682	92.5	181.2	11.32	233	193.6	157.8
K(mg/l)	16.1	7	1.3	22	6	1.6	14.5	14	8.5
Ca(mg/l)	0.17	15.25	3.87	3.28	0.25	16.5	0.05	0.4	0.05
Mg(mg/l)	0.47	6.15	0.69	0.62	9.5	5.65	11.6	11.5	11.55
Fe(mg/l)	0.01	9.20	0.03	0.25	0.04	2.78	0.13	0.01	0.14
Mn(mg/l)	---	---	---	---	---	---	---	---	---
F(mg/l)	0.64	nd	nd	0.74	1.16	nd	0.86	0.84	1.17
As(mg/l)	---	---	---	---	---	---	---	---	---
HCO ₃ (mg/l)	---	---	---	---	---	---	---	---	---
SO ₄ (mg/l)	240	15	nd	155	48	nd	170	450	480
Cl(mg/l)	---	---	---	---	---	---	---	---	---
NO ₃ -N(mg/l)	0.1	8.5	0.1	0.2	nd	0.7	0.1	0.4	1.9
NH ₃ -N(mg/l)	nd	1.15	0.04	nd	0.01	0.43	nd	0.08	0.03
TDS(mg/l)	370	90-100	15	330-360	510-700	80-110	690-890	680	670

Water Quality Test Data (2000)

(7/18)

Sample No.	55	56	57	58	59	60	61	62	63
District	Nachingwea	Liwale	Liwale	Liwale	Liwale	Liwale	Liwale	Liwale	Liwale
Village	Mkotukuyana	Makata	Ngunja	Likombora	Mihumo	Mkutano	Ndanyunga	Kiangara	Mukunya
Lati(Deg.-S)	-10.3928	-9.6908	-10.2273	-9.8637	-9.9227	-9.4	-9.5818	-9.9318	-9.7908
Long(Deg.-E)	38.889	37.8797	37.8797	37.9445	37.926	38.1573	37.9073	38.3888	38.1388
Date	3/28	3/28	3/28	3/29	3/29	3/30	3/30	3/31	3/31
Source	Borehole(softy?)	Dug well	Dug well	Borehole	River	Dug well	Dug well	Borehole	Dug well
pH	6.5	6.1	5.7	5.8	7.8	6.2	7.2	6.6	6.8
Temperature(	27.3	29.4	26.9	26.1	26.4	27.5	26.9	27.7	26.1
EC(μ S/cm)	1173.0	287.0	319.0	191.0	286.0	135.0	440.0	2588.0	123.0
Coliform	---	nd	y	y	y	y	y	nd	y
Do(mg/l)	2.0	2.8	2.6	0.4	4.1	2.8	3.1	2.0	2.3
Turbidity(UT	2.0	41.0	3.0	9.0	0.0	181.0	20.0	2.0	206.0
Na(mg/l)	141.6	28	19.45	23.8	20.3	11.51	32.7	300	9.53
K(mg/l)	7	5	15	6.5	6	0.8	7.7	9.4	5.3
Ca(mg/l)	nd	0.65	14	0.05	5.15	0.4	0.15	1.3	12.5
Mg(mg/l)	14.55	15.75	7.35	17.05	11.15	6	16.5	2.55	7.45
Fe(mg/l)	0.88	1.33	0.04	0.28	0.47	1.21	0.17	0.29	1.04
Mn(mg/l)	---	---	---	---	---	---	---	---	---
F(mg/l)	1.14	nd	0.33	nd	0.05	nd	0.04	1.25	nd
As(mg/l)	---	---	---	---	---	---	---	---	---
HCO ₃ (mg/l)	---	---	---	---	---	---	---	---	---
SO ₄ (mg/l)	180	nd	nd	nd	nd	nd	nd	11	2
Cl(mg/l)	---	---	---	---	---	---	---	---	---
NO ₃ -N(mg/l)	2	0.4	0.2	0.5	0.1	2.8	0.5	nd	3.8
NH ₃ -N(mg/l)	0.08	0.11	0.01	0.13	nd	0.13	0.03	nd	0.18
TDS(mg/l)	460-530	130-170	130-170	120-160	100-130	45-60	140-190	800-1100	75-90

Water Quality Test Data (2000)

(12/18)

Sample No.	100	101	102	103	104	105	106	107	108
District	Lindi	Lindi	Lindi	Lindi	Lindi	Lindi	Lindi	Lindi	Lindi
Village	Nyengedi	Madingo	Malungo	Mtua Kilimahewa	Kiwalala	Madangwa	Mnolela	Hingawali	Mnolela
Lati(Deg.-S)	-10.2487	-10.4491	-10.5634	-9.3343	-10.1888	-10.2147	-10.2237	-10.1927	-10.2237
Long(Deg.-E)	39.4253	39.6728	39.6675	39.4598	39.5357	39.8623	39.7385	39.7943	39.7385
Date	8/18	8/21	8/21	8/22	8/22	8/23	8/23	8/23	9/6
Source	River	Dam	River	Spring	Spring	Spring	Dug well	Dug well	Test Well
pH	7.2	6.3	5.8	5.4	5.4	6.3	6.8	5.9	7.2
Temperature(	23.9	24.6	23.7	27	27.5	27.5	26.4	24.5	28
EC(μ S/cm)	357	192	673	293	295	1845	1393	1325	3910
Coliform	---	---	---	---	---	---	---	---	---
Do(mg/l)	5.8	2.6	1.8	3	4.9	2.1	3.2	2.8	---
Turbidity(UT	40	337	8	0	4.1	1	8	32	0.1
Na(mg/l)	137.4	12.9	93	22	34.7	147	101	164	948
K(mg/l)	5.8	32.5	16.1	10.3	8.7	7.8	31.3	11	5.2
Ca(mg/l)	nd	33	27.3	24	24.3	0.69	14.5	42.5	19.8
Mg(mg/l)	3.4	3.14	3.21	2.01	2.59	0.99	1.87	1.07	3.36
Fe(mg/l)	0.34	1.83	0.42	0.04	0.02	nd	0.02	0.98	0.03
Mn(mg/l)	nd	nd	nd	0.1	0.2	0.1	0.4	nd	0.2
F(mg/l)	0.18	0.34	0.26	0.21	0.12	0.71	0.94	0.24	1.57
As(mg/l)	---	nd	nd	nd	nd	nd	nd	nd	nd
HCO ₃ (mg/l)	---	17.5	25.1	13.7	6.9	101	93	51.1	295
SO ₄ (mg/l)	nd	nd	nd	nd	12	110	305	nd	530
Cl(mg/l)	---	13	88	35	22	143	29	226	364
NO ₃ -N(mg/l)	nd	1.7	0.4	0.2	4.3	0.9	0.1	nd	nd
NH ₃ -N(mg/l)	nd	0.02	0.17	nd	0.02	0.03	nd	0.1	0.85
TDS(mg/l)	---	455	264	111	125	515	588	532	2168

Water Quality Test Data (2000)

(13/18)

Sample No.	109	110	111	112	113	114	115	116	117
District	Mtwara	Masasi	Tandahimba	Tandahimba	Mtwara	Nachingwea	Kilwa	Lindi	Lindi
Village	Arusha Chini	Nanyunmbu	Tandahimba	Tandahimba	Ziwani	Chinongwe	Pandeplot	Kilangala	Nyengedi
Lati(Deg.-S)	-10.6066	-11.1444	-10.7547	-10.7553	-10.3413	-10.4701	-9.1321	-9.7246	-10.2497
Long(Deg.-E)	40.1436	38.4862	39.6193	39.6222	40.2451	38.9177	39.5609	39.583	39.4305
Date	9/7	9/10	9/3	9/5	9/20				11/1
Source	Test Well	Test Well	Borehole(1)	Borehole(2)	Test Well	Test Well	Test Well	Test Well	River
pH	7.4	7.5	7.6	7.6	7.1	7.9	7.0	7.9	8.6
Temperature(	27.5	27.5	27.5	27.5	26			31	24.5
EC(μ S/cm)	700	1040	590	350	1549	1320	7100	1090	311
Coliform	---	---	---	---	---	---	---	y	y
Do(mg/l)	---	---	---	---	---	---	---	---	---
Turbidity(UT.	0.5	1.6	26	6.2	29	---	---	---	---
Na(mg/l)	127	122	67.9	53.6	239	189	782	303	38.5
K(mg/l)	13.5	2	23.6	16	19.3	3	19.4	5.7	10
Ca(mg/l)	42.5	1.2	31.5	18.3	38.3	0.78	6.8	16.9	22
Mg(mg/l)	2.07	0.06	2.44	2.88	0.68	1.84	0.9	21.1	16.9
Fe(mg/l)	0.01	0.02	0.04	nd	1.96	0.05	0.01	0.06	1.15
Mn(mg/l)	0.2	0.1	0.1	nd	0.3	0.3	0.4	nd	0.1
F(mg/l)	nd	1	0.26	nd	0.24	1.67	0.37	0.28	0.56
As(mg/l)	nd	nd	nd	nd	nd	nd	nd	nd	nd
HCO ₃ (mg/l)	74.7	215	32	10.7	82.3	173	76.2	373	14.5
SO ₄ (mg/l)	nd	13	1	1	100	73	335	23	nd
Cl(mg/l)	85	45	79	46.5	200	160	1261	55	55.5
NO ₃ -N(mg/l)	0.1	4.7	nd	nd	nd	2	21	0.1	0.35
NH ₃ -N(mg/l)	0.22	nd	0.03	0.01	0.6	0.03	nd	0.46	nd
TDS(mg/l)	346	405	263	155	712	605	2503	799	159

Water Quality Test Data (2000)

(14/18)

Sample No.	118	119	120	121	122	123	124	125	126
District	Lindi	Lindi	Masasi	Masasi	Masasi	Newara Kitangali	Lindi	Mtwara	Lindi
Village	Mahinwa	Chiwarere	Lukuledi	Mlingula	Kilosa	Mitama	Mnazimoja	Mpapula	Kilangala
Lati(Deg.-S)	-10.3357	-10.3663	-10.5792	-10.7345	-10.8387	-10.6622	-10.1177	-10.2553	-9.7246
Long(Deg.-E)	39.2598	39.1892	38.8128	38.6767	38.6502	39.2917	39.6173	39.9195	39.583
Date	11/1	11/1	11/1	11/1	11/1	11/2	11/2	11/2	11/7
Source	River	Pit	Borehole	Borehole	Dug Well	Borehole	Borehole	Borehole	Test Well
pH	8.1	7.3	7.6	6.7	6.8	4.1	7.2	7.0	7.9
Temperature(	26.1	30.9	28.9	28.1	26.7	27.1	23.3	28.4	31
EC(μ S/cm)	113	840	1580	88	2390	255	700	1300	1090
Coliform	y	y	n	y	y	y	y	y	y
Do(mg/l)	---	---	---	---	---	---	---	---	---
Turbidity(UT.	---	---	---	---	---	---	---	---	---
Na(mg/l)	12.4	77.6	200	14.9	433	36.3	22.8	114	294
K(mg/l)	5.5	8	13.0	11.5	11	6	12	12.5	10.5
Ca(mg/l)	17.1	nd	23.2	6.6	nd	8.7	23.8	nd	17.8
Mg(mg/l)	6.8	27.6	196	4.4	24.1	10.9	32.7	28	19.1
Fe(mg/l)	14.35	2.60	0.15	1.32	1.00	0.15	1.02	0.5	0.03
Mn(mg/l)	nd	1	0.2	nd	0.2	0.3	0.5	0.2	0.1
F(mg/l)	1.16	1.66	1.93	0.96	1.63	0.7	1.15	1.4	0.2
As(mg/l)	nd	nd	nd	nd	nd	nd	nd	nd	nd
HCO ₃ (mg/l)	13.0	203	352	6.9	224	nd	189	277	381
SO ₄ (mg/l)	nd	50	70	5	nd	nd	nd	55	5
Cl(mg/l)	16	42.1	142	17.5	325	24	68.3	146	47.4
NO ₃ -N(mg/l)	0.4	0.7	0.8	2.0	0.2	1.3	nd	nd	nd
NH ₃ -N(mg/l)	0.07	0.12	0.01	0.03	0.05	nd	nd	0.33	0.4
TDS(mg/l)	87	415	999	71	1021	88	351	634	776

Water Quality Test Data (2000)

(15/18)

Sample No.	127	128	129	130	131	132	133	134	135
District	Lindi	Kiluwa	Kiluwa	Kiluwa	Kiluwa	Kiluwa	Kiluwa	Kiluwa	Kiluwa
Village	Kiranjeranje	Mandawa	Kiwawa	Ruhatwe	Nangnlukulu	Singino	Kiluwa Masoko	Mpara	Lihinmalyao
Lati(Deg.-S)	-9.517	-9.3708	-9.183	-8.7848	-8.787	-8.7698	-8.9245	-8.8493	-9.3433
Long(Deg.-E)	39.4693	39.435	39.3692	39.1863	39.3713	39.4088	39.5137	39.4573	39.6315
Date	11/7	11/7	11/7	11/7	11/7	11/7	11/8	11/8	11/8
Source	Borehole	(River)pond	Pit	Dug well	Spring	Spring	Borehole	Dug well	Pond(Spring)
pH	8.2	8.0	7.5	7.5	6.5	7.1	7.3	6.9	7.0
Temperature(	31.4	32.2	29.6	27.7	30.4	25.4	28.0	27.3	28.1
EC(μ S/cm)	1380	1540	1630	4650	1160	1350	770	196	5420
Coliform	y	y	y	y	y	y	n	y	y
Do(mg/l)	---	---	---	---	---	---	---	---	---
Turbidity(UT.	---	---	---	---	---	---	---	---	---
Na(mg/l)	349	281	201	863	193	245	90.8	27	831
K(mg/l)	6.5	8.5	10	12	16.5	12	34.5	6.5	34
Ca(mg/l)	12.7	44.3	nd	3.8	24	16.3	26.8	7.3	20
Mg(mg/l)	23.4	39.6	25.1	49.2	35.5	40	66.4	7.5	54.6
Fe(mg/l)	0.04	0.06	0.76	0.12	2.47	1.79	0.12	0.18	0.07
Mn(mg/l)	0.1	0.1	0.3	0.3	0.1	0.1	0.1	nd	0.3
F(mg/l)	0.48	0.44	0.50	1.1	0.15	0.21	0.33	0.2	0.4
As(mg/l)	nd	nd	nd	nd	nd	nd	nd	nd	nd
HCO ₃ (mg/l)	401	185	324	465	18.3	16.8	38.9	7.6	323
SO ₄ (mg/l)	96	55	352	800	60	130	40	22.5	295
Cl(mg/l)	53	184	106	388	168	168	51	26.4	607
NO ₃ -N(mg/l)	nd	0.04	nd	nd	nd	nd	23	nd	2.3
NH ₃ -N(mg/l)	0.3	0.1	0.18	0.13	0.02	0.02	0.09	0.1	0.4
TDS(mg/l)	942	799	1020	2582	518	631	372	105	2169

Water Quality Test Data (2000)

(16/18)

Sample No.	136	137	138	139	140	141	142	143	144
District	Lindi	Mtwara	Ruangwa	Ruangwa	Ruangwa	Ruangwa	Ruangwa	Ruangwa	Ruangwa
Village	Lidayawya	Mikindani	Nanganga	Chilangalile	Machanganja	Liuguru	Mihewe	Litama	Ipingo
Lati(Deg.-S)	-9.8702	-10.2755	-10.3905	-10.1703	-9.9537	-10.0197	-9.9342	-10.4846	-10.4014
Long(Deg.-E)	39.7368	40.1055	39.1398	38.8365	38.8106	38.989	38.8586	38.8994	39.0182
Date	11/8	11/8	11/8	11/6	11/4	11/6	11/6	11/7	11/7
Source	Dam(Spring)	Spring(big)	River	Dug well	(River)pit	Dug well	Dug well	Dug well	Dug well
pH	7.9	7.6	8.1	7.1	6.7	6.4	7.3	---	8.5
Temperature(	26.9	28.3	27.8	25.6	25.2	26.7	26.3	---	29.4
EC(μ S/cm)	1010	1060	2644	3000	3300	1103	2924	4630	264
Coliform	y	n	n	y	y	y	n	---	y
Do(mg/l)	---	---	4.8	4.3	3.6	3.76	5.98	---	6.1
Turbidity(UT.	---	---	4	133	17	12	6	---	197
Na(mg/l)	152	88	352	295	309	39.8	234	521	10.9
K(mg/l)	7	10.5	8.9	24.3	6.2	19.3	17.9	3.4	3.3
Ca(mg/l)	21.5	67	0.4	14	19	5.0	nd	18.2	40.8
Mg(mg/l)	30	28.6	55.4	187	35.4	54.8	28.6	5.6	6.2
Fe(mg/l)	0.05	0.02	nd	2.45	0.04	0.03	0.02	0.03	0.12
Mn(mg/l)	nd	nd	0.2	1.2	nd	0.4	0.1	0.3	0.5
F(mg/l)	0.34	0.08	1.69	2.45	1.35	1	1.86	1.30	1.63
As(mg/l)	nd	nd	nd	nd	nd	nd	nd	nd	nd
HCO ₃ (mg/l)	213	244	248	492	192	67.8	326	191	31.2
SO ₄ (mg/l)	50	55	375	946	593	200	1430	150	11
Cl(mg/l)	95	86	247	48.3	308	39.1	42.1	884	13
NO ₃ -N(mg/l)	nd	nd	nd	0.1	nd	nd	nd	nd	nd
NH ₃ -N(mg/l)	0.02	0.04	0.07	nd	nd	nd	nd	nd	0.05
TDS(mg/l)	568	579	1298	2150	1484	443	2093	1775	322

Water Quality Test Data (2000)

(17/18)

Sample No.	145	146	147	148	149	150	151	152	153
District	Ruangwa	Nachingwea	Nachingwea	Nachingwea	Nachingwea	Nachingwea	Nachingwea	Nachingwea	Nachingwea
Village	Chibula	Mkonojela(1)	Mkonojela(2)	Litula	Rweje	Chiumbati Miembeni	Mandahi	Kipara Mtua	Mpiruka
Lati(Deg.-S)	-9.9234	-10.2402	-10.2402	-10.2069	-10.1223	-10.4163	-10.3584	-10.3704	-10.2833
Long(Deg.-E)	39.0451	38.6256	38.6256	38.7799	38.7672	38.8076	38.8529	38.577	38.8095
Date	11/4	11/9	11/9	11/9	11/9	11/10	11/11	11/10	11/9
Source	(River)Pit	Borehole	Dug well	Dug well	Borehole	Dug well	Dug well	Borehole	Dug well
pH	6.9	6.7	7.0	7.6	6.9	7.5	5.8	6.9	6.8
Temperature(	29.4	28.0	27.4	26.9	27.3	27.8	25.2	27.5	29.8
EC(μ S/cm)	1252	3500	1273	1307	5100	305	526	2739	93
Coliform	y	y	y	y	n	y	y	n	y
Do(mg/l)	4.6	6.8	3.8	4.8	3.8	6.3	4.3	4.2	5
Turbidity(UT.	15	2	5	15	1	27	6	10	208
Na(mg/l)	75.5	237	68.5	99.7	319	19.3	56.9	154	8.9
K(mg/l)	11.5	44	3.7	31.5	34.3	6.2	2.3	36.7	2
Ca(mg/l)	13.6	14	10.8	7.4	nd	9.4	9.0	33.4	9.2
Mg(mg/l)	42.4	94.5	47	66	0.2	4.8	16.4	40.8	4.4
Fe(mg/l)	nd	0.9	nd	nd	0.01	0.24	0.57	6.06	0.22
Mn(mg/l)	0.3	0.8	0.2	0.1	nd	0.1	0.6	0.2	nd
F(mg/l)	1.75	0.33	0.65	0.78	0.99	1.08	0.26	1.45	0.4
As(mg/l)	nd	nd	nd	nd	nd	nd	nd	nd	nd
HCO ₃ (mg/l)	171	132	264	356	360	4.6	8.4	380	6.9
SO ₄ (mg/l)	292	25	1	12.5	25	2	2.5	1015	4
Cl(mg/l)	17	494	77	30	644	20.7	58	53.1	11.6
NO ₃ -N(mg/l)	nd	nd	nd	nd	nd	nd	nd	nd	nd
NH ₃ -N(mg/l)	nd	nd	0.06	nd	0.03	0.05	nd	0.01	0.1
TDS(mg/l)	644	1051	483	623	1388	102	166	1735	261

Water Quality Test Data (2000)

(18/18)

Sample No.	154	155	156	157	158	159	160	161
District	Liwale	Liwale	Liwale	Liwale	Liwale	Masasi	Masasi	Masasi
Village	Mlembwe	Mikunya	Mihumo	Mbaya	Ngongowele	Mbwinji	Mbwinji	Mbwinji
Lati(Deg.-S)	-9.6813	-9.791	-9.9402	-9.6654	-10.0784	-10.5117	-10.5117	-10.5117
Long(Deg.-E)	37.5963	38.0754	37.9098	37.96	37.882	39.0913	39.0913	39.0913
Date	11/1	11/3	11/2	11/2	11/2	11/15	11/15	11/15
Source	Pond	Dug well	Spring	(River)Pit	(River)Pit	Spring1	Spring2	River
pH	5.4	5.9	6.0	4.7	6.6	7.2	5.5	6.1
Temperature(	26.2	25.5	27.8	29.4	26.7	---	---	---
EC(μ S/cm)	57	114	175	945	299	160	139	144
Coliform	n	y	y	y	n	---	---	---
Do(mg/l)	3.5	3.3	3.4	6.2	3.2	---	---	---
Turbidity(UT	157	195	2	61	157	---	---	---
Na(mg/l)	5.8	7.4	17.6	69.3	11.7	19.7	16.6	17.1
K(mg/l)	2.6	8.0	4.1	9.7	5.2	3.5	3.7	3.5
Ca(mg/l)	18	12.8	22.6	6	51.4	9.2	7.8	8.5
Mg(mg/l)	3.6	12.2	16.2	57.4	27.8	12.6	10.8	10.9
Fe(mg/l)	0.44	0.48	1.09	0.22	0.34	0.07	0.02	0.03
Mn(mg/l)	0.1	nd	nd	3.3	nd	nd	0.2	0.1
F(mg/l)	0.91	0.18	0.2	0.84	0.83	0.21	0.25	0.24
As(mg/l)	nd	nd	nd	nd	nd	---	---	---
HCO ₃ (mg/l)	13.7	21.3	33.5	130	67.8	6.1	0.8	2.3
SO ₄ (mg/l)	nd	1	nd	5	nd	nd	1	1
Cl(mg/l)	13.9	6.9	13.2	73.9	7.6	31.5	23.1	27.5
NO ₃ -N(mg/l)	nd	nd	nd	nd	0.2	0.6	1.3	1
NH ₃ -N(mg/l)	0.42	0.01	nd	0.29	nd	---	---	---
TDS(mg/l)	220	269	114	423	333	83	66	72

6. Questionnaire forms for social surveys, household economy survey

WATP questionnaire for Lindi and Mtwara water and sanitation project

village _____ district _____ region _____

name of enumerator _____ today's date _____ questionnaire number _____

This survey is for the Lindi and Mtwara water and sanitation project. It will not be used for any other purpose. You do not need to give your name to the enumerator. The answers on paper will put into a plain envelope and mixed with many others. The project only needs to know the overall position.

Table 1 demographic profile of household

household members present	F = female M = male	S = single M = married W = widowed D = divorced	approx. age in years	highest grade at school	present occupation
1 st					
2 nd					
3 rd					
4 th					
5 th					
6 th					
7 th					

If > 7, write on the back of this page. Include only members of one household, that of the respondent.

Table 2 household income

sources of household cash income	specify items	total household income last year (1999) from each source

Likely sources are employment (*specify*) or casual labour (*specify*) and/or sale of crops (*specify*) and/or fish and/or livestock (*specify*) and/or other goods (*specify*) and/or services (*specify*).

Table 3 household expenditure

average household expenditure	<i>either</i> per month	<i>or</i> per year (as preferred by respondent)
food and drink		
education		
health		
travel		
water		
fuel (<i>specify</i>)		
other (<i>specify</i>)		
other (<i>specify</i>)		
other (<i>specify</i>)		

Table 4 willingness and ability to pay for water

If an improved water source came to be available in your village, how much would you be willing and able to pay per 20-litre bucket of clean water?	✓
unable or unwilling to pay anything	
1/=	
2/=	
3/=	
4/=	
5/=	
6/= to 9/=	
10/= or more	

Thank you for your help with this survey.

**Hojaji juu ya uhiari na uwezo wa kulipia maji na usafi wa mazingira kwa
Mikoa ya Mtwara na Lindi**

Kijiji _____ Wilaya _____ Mkoa _____

Jina la Mhojaji _____ Tarehe ya hojaji _____ Namba ya Hojaji _____

Tafiti hii inahusu mradi wa maji na usafi wa mazingira wa mradi wa Lindi na Mtwara. Haitatumika kwa kitu kingine chochote. Si lazima utoe jina kwa mhojaji. Majibu yako yatawekwa kwenye bahasha na kuchanganyika na majibu ya watu wengine. Mradi unataka kujua hali halisi ya hapa..

Kielelezo 2 Idadi ya watu kwenye Kaya

Wakazi waliopo	Wanaume Wanawake	Hajaoa/hajaolewa Ameoa/ameolewa Wajane Walioachika	Makadirio ya umri kwa miaka	Elimu ya juu	Kazi ya sasa
1					
2					
3					
4					
5					
6					
7					

Kama ni zaidi ya 7 andika nyuma ya karatasi hii. Orodhesha tu wakazi wa kaya ya mhojiwa

Kielelezo 2 Kipato cha Kaya

Vyanzo vya kipato cha kaya	Fafanua kila kipengele	Jumla ya kipato cha kaya kwa mwaka uliopita (1999) kwa kila chanzo

Ni vyanzo vipi vya kipato cha kuajiriwa, (fafanua), Kibarua (fafanua), na/au mauzo ya mazao (fafanua) na/ au samaki na/au mifugo (fafanua) na/au bidhaa nyingine (fafanua) na/au huduma (fafanua)

Kielelezo 3 Matumizi ya Kaya

Wastani wa matumizi kwa kaya	<i>au Kwa mwezi</i>	<i>au kwa mwaka (upendeleo wa mhojiwa)</i>
Chakula na kinywaji		
Elimu		
Afya		
Usafiri		
Maji		
Nishati (fafanua)		
Mengineyo (fafanua)		
Mengineyo (fafanua)		
Mengineyo (fafanua)		

Kielelezo 4 Kuwa tayari kulipa na uwezo wa kulipa gharama za maji

Kama maji safi yanapatikana kijijini kwako, wewe uko tayari kununua kiasi gani cha maji safi ndoo ya lita 20?	✓
Siko tayari na sina uwezo wa kununua kiasi chochote	
1/=	
2/=	
3/=	
4/=	
5/=	
6/= to 9/=	
10/= au zaidi	

Asante sana kwa kusaidia utafiti huu

Village Profile for the Lindi and Mtwara Water and Sanitation Project

1. Identity of the village

Region: _____ District: _____ Ward: _____

- 1.1 Name of the village: _____
- 1.2 Names of sub-villages: _____
- 1.3 Distances to the sub-villages, if any: _____
- 1.4 Language spoken in this village: _____
- 1.5 Major religion of the people: _____

2. History of the village

- 2.1 Year established: 19 _____
- 2.2 Year registered: 19 _____
- 2.3 Other information: _____

3. Population

- 3.1 Number of household as of 2000: _____, at the census 1988: _____
- 3.2 Number of adult female as of now: _____, at the census 1988: _____
- 3.3 Number of adult male as of now: _____, at the census 1988: _____
- 3.4 Total population as of 2000: _____, at the census 1988: _____
- 3.5 Average household size in this village: _____
- 3.6 Trend of death and birth: _____
- 3.7 Main causes of death: _____
- 3.8 In and out migration trend: _____
- 3.9 Main cause of above: _____
- 3.10 Percentage of men having more than 2 wives: approximately _____ %

4. Village government

- 4.1 Number of ten-cells: _____
- 4.2 Committees: _____

- 4.3 Whole village council: No. of women: _____, No. of men: _____
If the number of women is small, why? _____

5. Institutional development

- 5.1 Where do children go to school? _____
- 5.2 Number of children at school as of 2000: _____
- 5.3 Number of school children not at school: _____
- 5.4 Main causes of drop-out children from school: _____
- 5.5 Highest level of education in this village: Primary/secondary/ _____
- 5.6 Percentage of school pupil reaching form 4 education: _____ %

6. Health

- 6.1 Health problems experienced: _____

- 6.2 People's knowledge of the causes of the mentioned diseases: _____
- 6.3 Type/kind of existing health facilities and their location:
_____, _____
_____, _____
- 6.4 Coping mechanism used (What is done to deal with those problems?):

7. Skills

- 7.1 Skills in the community: _____
- 7.2 Skills shortage: _____
- 7.3 Coping mechanism used to deal with skills shortage: _____

8. Income-generation

- 8-1 Enterprises within the villages: _____

- 8-2 Other sources of income: _____
- 8-3 Activities to increase income: _____
- 8-4 Average annual income of household in this village: _____

9. Extent of the village (Specify acres, hectares or square kilometers for each item.)

9-1 Total area of this village excluding sub-villages: _____

including sub-villages: _____

9-2 Area of under crops as of 2000 in this village: _____

9-3 Crop land fallow: _____ 9-4 Area under trees: _____

9-5 Area of grazing land: _____ 9-6 Others() _____

10. Cultivation

10-1 Principal crops of this village, and the total of last harvest:

_____, _____ Bags/kg/tones

10-2 Other crops of this village, and the total of last harvest:

_____, _____ bags/kg/tones

_____, _____ bags/kg/tones

10-3 Farm size owned and cultivated by household:

Ranging from _____ to _____ acres/hectares/sq.km,

Averaging _____ acres/hectares/sq.km

10-4 Principal constraints on increasing productivity:

10-5 Coping mechanism used to relieve those difficulties:

11. Livestock

11-1 livestock of this village (kind and total number) as of 2000

Cows: _____, Goats: _____

Sheep: _____, (): _____

11-2 Number of sheep/goat owned by household:

Ranging from _____ to _____, averaging _____

11-3 Principal constraints on increasing productivity:

11-4 Coping mechanism used to relieve those difficulty:

12. Soil and vegetation

12-1 Present condition of soil: Hard/Soft, Stabilized/Exposed to erosion, Fertile/Sterile,

12-2 Measures used to protect soil or to fertilize : _____

12-3 Other environmental concern: _____

12-4 Coping mechanism used: _____

13. Other issues and concern

13-1 Other problems---specify: _____

13-2 Coping mechanism used to relieve those difficulties:

13-3 New opportunities to be taken: _____

14. Priorities to be taken

14-1 Top priority for improvement: _____

14-2 What's being done about it? _____

14-3 Second priority for improvement: _____

14-4 What's being done about it? _____

14-5 Other priorities: _____

15. Water supply

15-1 Have you ever had public water supply in your village? Yes/No

15-2 If yes, reply the following:

Type of the supply facility: -Shallow (dug) wells with hand-pump _____ places
- Borehole well with hand-pump _____ places
-Public faucets _____ places

Since when it is out of use? Since the year _____

15-3 Which type of water source you are using during dry season?

- () Flowing river water _____ km apart from the center of village
- () Dam _____ km apart from the village center
- () Shallow pit on the river bed _____ km apart from the village center
- () Shallow dug well without protection _____ km apart from village center
- () Shallow dug well with protection _____ km apart from village center

15-4 Quantity and quality of water from above sources:

- Quantity sufficient? Yes/No
- Quality: high turbidity / salty / bad-tasting / () / good enough
Do you think it is safe enough for drinking purpose? Yes / No

15-5 Time required to fetch water: _____ minutes for one round
_____ times a day in average, totaling _____ hours a day

15-5 Water consumption: 0.3 / 0.5 / 1.0 / 1.5 buckets per person a day

16. Water supply management

16-1 Is there water committee? Yes / No If yes, reply the following:

16-2 Does the village have a water account? Yes / No

16-3 How much are they paying for water fund for future facility construction?

_____ Shilingi per household per year

16-4 How much amount is so far deposited at water account? _____ Shilingi

16-5 Since when? Since the year _____

16-5 Do you have any lady executive members of water committee? Yes / No

If "No", what's the reason? _____

If yes, how many out of _____ members?

16-6 Are you willingly form the new water committee which involves more lady executive members? Yes / No

17. Willingness to participate (contribute) in water project

If the clean and stable water is easily available under the coming water project, do you think the villagers are willing to participate in the construction works and operation and maintenance works?

- Very willingly
- Willingly
- Depends on the type of facility
- No willingness
- Prefer existing condition

18. Willingness to pay and ability to pay for operation and maintenance (O/M) cost

If the new public water supply facilities are constructed in this village, do you think the villagers are willing to operate and maintain the facility by themselves under technical assistance (not financial assistance) from the district water department?

- 18-1 How much are the villagers paying for water as of now, in case that they are fetching water from adjacent supply system? _____ Shillings per bucket.
- 18-2 How much are the villagers paying, in case that they are buying water from the water vendor? _____ Shillings per bucket
- 18-3 Do you think the villagers are willing to pay for the O/M cost?
 - Very willingly
 - Willingly
 - Someone will not have willingness to pay
- 18-3 How much amount they are willing to pay? (Upper limit)
(If the facility may be motorizes pump system, O/M cost shall require over 1000 shillings per household per month. While the facility may be the hand-pump well, O/M cost will be lower than 500 shillings per household per month)
 - 2000 shillings 1500 shillings
 - 1000 shillings 500 shillings or lower
- 18-4 Although they have strong willingness to pay, many of the villagers have financial constraints which do not allow periodical payment. How much do you think they can pay for O/M cost?
 - Over 2000 shillings per household per month
 - Between 1500 and 2000 shillings / house / month
 - Between 1000 and 1500
 - Between 500 and 1000
 - Lower than 500 shillings

19. Health and sanitation

19-1 How do villagers treat/handle the household rubbish? _____

19-2 How much percentage of the households do have latrines? _____%

19-3 What materials are used to wash utensils? _____

19-4 How much % of the households have special hut for livestock? _____%

20. Wealth indicators

20-1 Number or percentage of houses with steel sheet roof: _____, (_____ %)

20-2 Number of vehicle owner in this village: _____

20-3 Number or percentage of bicycle owner in this village: _____ (_____ %)

20-4 Number of houses with electricity: _____

20-5 Number or percentage of the household using kerosene stove for cooking:
(_____ %)

21. Other socio-economic services available in the village

() Flour milling machine

() Churches / mosque

() Bar

() Restaurant / teashop

() Guest houses

() Police post / lock-up

() Local court

() _____

() _____

() _____

Add any other comments here, or questions.
