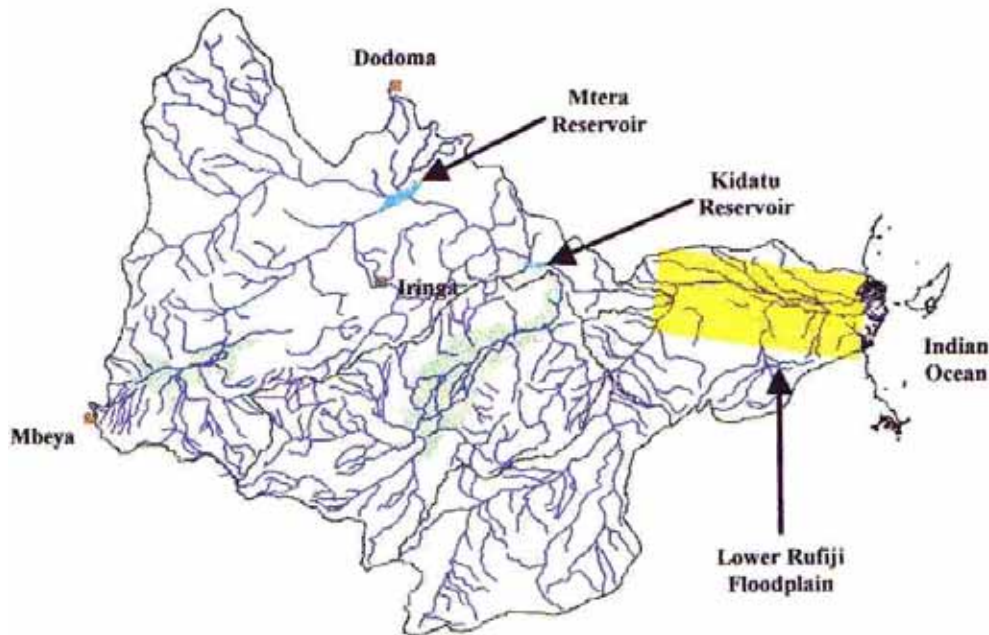


**Environmental Management and Biodiversity Conservation of Forests,
Woodlands, and Wetlands of the Rufiji Delta and Floodplain**

**Development of a Computerised Flood Warning
Model and Study of Hydrological Characteristics
of the Lower Rufiji Floodplain and Delta**



Technical Report No. 14 Vol. 2: Appendices



March 2003

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¹ The Rufiji District Council implements Rufiji Environment Management Project with technical assistance from IUCN – The World Conservation Union, and funding from the Royal Netherlands Embassy.

Rufiji Environment Management Project – REMP

Project Goal: To promote the long-term conservation through ‘wise use’ of the lower Rufiji forests, woodlands and wetlands, such that biodiversity is conserved, critical ecological functions are maintained, renewable natural resources are used sustainably and the livelihoods of the area’s inhabitants are secured and enhanced.

Objectives

- To promote the integration of environmental conservation and sustainable development through environmental planning within the Rufiji Delta and Floodplain.
- To promote the sustainable use of natural resources and enhance the livelihoods of local communities by implementing sustainable pilot development activities based on wise use principles.
- To promote awareness of the values of forests, woodlands and wetlands and the importance of wise use at village, district, regional and central government levels, and to influence national policies on natural resource management.

Project Area

The project area is within Rufiji District in the ecosystems affected by the flooding of the river (floodplain and delta), downstream of the Selous Game Reserve and also including several upland forests of special importance.

Project Implementation

The project is run from the district Headquarters in Utete by the Rufiji District Administration through a district Environmental Management Team coordinated by the District Executive Director. The Project Manager is employed by the project and two Technical Advisers are employed by IUCN.

Project partners, particularly NEMC, the Coast Region, RUBADA, The Royal Netherlands Embassy and the Ministry of Natural Resources and Tourism, collaborate formally through their participation in the Project Steering Committee and also informally.

Project Outputs

At the end of the first five –year phase (1998-2003) of the project the expected outputs are:

An Environmental Management Plan: an integrated plan for the management of the ecosystems (forests, woodlands and wetlands) and natural resources of the project area that has been tested and revised so that it can be assured of success - especially through development hand-in-hand with the District council and the people of Rufiji.

Village (or community) Natural Resource Management Plans: These will be produced in pilot villages to facilitate village planning for natural resource management. The project will support the implementation of these plans by researching the legislation, providing training and some support for zoning, mapping and gazettement of reserves.

Established Wise Use Activities: These will consist of the successful sustainable development activities that are being tried and tested with pilot village and communities and are shown to be sustainable

Key forests will be conserved: Forests in Rufiji District that have shown high levels of plant biodiversity, endemism or other valuable biodiversity characteristics will be conserved by gazettement, forest management for conservation, and /or awareness-raising with their traditional owners.

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Appendix A2.1: List of Available Rainfall Stations for the Ruffiji River Basin in WREP database

S/no	Station code	Station name	Longitude	Latitude	Duration		No. of Years of available data	% Missing
					From	To		
1	09536004	DABALO DAM	36.133	-5.783	01/1962	12/1993	32	1.32
2	09536017	IKAMBO MET. STATION	36.083	-5.717	01/1977	12/1990	14	4.75
3	09635001	DODOMA AIRPORT	35.767	-6.167	01/1932	12/1995	64	3.13
4	09635010	KINUNGURU	35.467	-6.900	01/1959	12/1995	37	9.94
5	09635011	ILANGALI	35.083	-6.800	01/1959	12/1990	32	9.39
6	09635012	DODOMA MAJI	35.750	-6.183	01/1961	12/1990	30	17.07
7	09635014	MATAMBULU DAM	35.767	-6.300	01/1962	12/1995	34	9.53
8	09635026	BIHAWANA SEMINARY	35.650	-6.233	01/1983	12/1990	8	1.06
9	09636000	MPWAPWA RESEARCH STATION	36.500	-6.333	01/1925	12/1961	37	1.84
10	09636006	KIBORIANI (MARTI)	36.550	-6.283	01/1938	12/1994	57	34.79
11	09636008	VIANZE DAIRY	36.500	-6.333	01/1947	12/1995	49	3.28
12	09636011	KISITWE	36.883	-6.333	01/1963	12/1964	2	45.83
13	09636013	KONGWA P.R.S	36.333	-6.033	01/1953	12/1995	43	8.34
14	09636018	UKAGURU FOREST STATION	36.950	-6.333	01/1956	12/1995	40	5.03
15	09636020	KINYASUNGWE	36.300	-6.200	01/1960	12/1995	36	3.62
16	09636026	GAIRO	36.867	-6.150	01/1970	12/1989	20	18.77
17	09636027	NONGWE PRIMARY SCHOOL	36.900	-6.467	01/1970	12/1993	24	29.24
18	09636029	KONGWA ADMIN.OFFICE	36.417	-6.200	01/1972	12/1990	19	8.85
19	09733000	LUPATINGATINGA HYDROMET	33.417	-7.660	01/1942	12/1994	53	50.65
20	09733002	MTANILA	33.500	-7.660	01/1976	12/1998	23	9.82
21	09733007				01/1939	12/1998	60	10.04
22	09734000	MKOPULE	34.567	-7.933	01/1960	12/1988	29	20.76
23	09734001	MSEMBE FERRY	34.900	-7.750	01/1967	12/1998	32	7.31
24	09735002	IROLE MISSION	35.833	-7.683	01/1941	12/1987	47	12.33
25	09735003	TOSAMAGANGA MISSION	35.600	-7.850	01/1941	11/1974	34	2.70
26	09735004	KIMANDE DISPENSARY	35.517	-7.367	01/1942	12/1993	52	54.54
27	09735007	IHIMBU FARM	35.817	-7.900	01/1952	12/1991	40	6.49
28	09735008	IDODI TARAFANI	35.183	-7.783	01/1954	12/1993	40	40.08

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S/no	Station code	Station name	Longitude	Latitude	Duration		No. of Years of available data	% Missing
					From	To		
29	09735013	IRINGA MET STN.(NDULI)	35.767	-7.633	01/1960	12/1998	39	0.51
30	09735014	IRINGA MAJI	35.700	-7.783	01/1960	12/1998	39	8.00
31	09735015	IRINGA EXPERIMENTAL STN	35.683	-7.767	01/1961	12/1998	38	25.25
32	09736003	ILULA PRIMARY SCHOOL	36.000	-7.667	01/1943	12/1991	49	18.44
33	09736004	SANJE ESTATE	36.917	-7.817	01/1949	12/1967	19	14.11
34	09736006	MALOLO	36.583	-7.333	01/1960	12/1991	32	11.75
35	09736007	ULAYA	36.900	-7.067	01/1960	12/1989	30	7.36
36	09736008	KISANGA PRIMARY SCHOOL	36.783	-7.300	01/1959	12/1993	35	46.72
37	09736012	(IMAGE) LYASSA PR. SCH.	36.117	-7.467	01/1970	12/1994	25	21.05
38	09736016	KIBEREGE PRIMARY SCHOOL	36.817	-7.983	01/1980	12/1994	15	22.30
39	09736017	MTERA	36.000	-7.100	01/1981	12/1995	15	1.68
40	09737000	DUTHUMI ESTATE	37.817	-7.383	01/1930	07/1986	57	43.14
41	09737005	SINGIZA MISSION	37.717	-7.250	01/1935	12/1995	61	3.10
42	09737006	MATOMBO PRIMARY SCHOOL	37.767	-7.083	01/1941	12/1994	54	6.27
43	09737008	KISAKI	37.600	-7.467	01/1938	12/1980	43	23.04
44	09737011	KIKEO MISSION	37.550	-7.217	01/1941	12/1982	42	16.25
45	09737013	CHENZEMA MISSION	37.600	-7.117	01/1946	12/1983	38	10.38
46	09737014	MVUHA	37.850	-7.200	01/1951	12/1962	12	9.01
47	09738000	MPANGANYA	38.667	-7.900	01/1923	12/1938	16	5.78
48	09738004	KIBITI	38.917	-7.700	01/1939	12/1963	25	14.31
49	09738014	SUNGWI PRIMARY SCHOOL	38.967	-7.033	01/1965	05/1990	26	70.55
50	09738017	CHOLE PRIMARY SCHOOL	38.650	-7.367	01/1977	12/1982	6	48.70
51	09738018	NGALAKULA VILLAGE	38.833	-7.817	01/1977	12/1995	19	30.77
52	09739022	MKURANGA N.C.D.P.	39.150	-7.183	01/1984	12/1999	16	14.08
53	09833000	MBEYA BOMA	33.450	-8.900	01/1923	12/1989	67	35.10
54	09833001	MBEYA MET	33.467	-8.930	01/1937	12/1998	62	5.65
55	09833002	CHUNYA AGRICULTURE	33.417	-8.530	01/1934	12/1998	65	6.88
56	09833003	ALLSA FARM	33.917	-8.917	01/1935	12/1957	23	13.08
57	09833010	IRAMBO PRIMARY SCHOOL	33.667	-8.950	01/1942	12/1992	51	38.43
58	09833015	KAWETIRI FORESTRY	33.500	-8.850	01/1951	12/1994	44	6.28
59	09833020	MBEYA BOMA	33.467	-8.910	01/1961	12/1998	38	12.53

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S/no	Station code	Station name	Longitude	Latitude	Duration		No. of Years of available data	% Missing
					From	To		
60	09833025	ALLSA FARM	33.650	-8.883	01/1970	12/1998	29	3.74
61	09834000	MADIBIRA MAJI	34.817	-8.233	01/1923	12/1995	73	26.73
62	09834001	MALANGALI SEC SCHOOL	34.917	-8.567	01/1921	12/1991	71	20.68
63	09834002	CHIMALA RIVER	34.033	-8.830	01/1935	12/1963	29	21.30
64	09834003	RUJEW A MISSION	34.333	-8.680	01/1942	12/1981	40	4.38
65	09834004	ILEMBULA MESSION	34.600	-8.880	01/1946	12/1965	20	7.53
66	09834005	LUHANYANA FARM	34.833	-8.900	01/1950	12/1963	14	11.32
67	09834006	IGAWA MAJI	34.383	-8.767	01/1956	12/1997	42	10.73
68	09834008	MBARALI IRR. SCHEME	34.250	-8.667	01/1957	12/1998	42	6.00
69	09834010	KIMANI	34.167	-8.833	01/1956	12/1998	43	11.35
70	09834011	SAJA	34.750	-8.583	01/1963	12/1985	23	21.80
71	09834012	CHIMALA PRIMARY SCHOOL	34.017	-8.850	01/1965	12/1982	18	75.01
72	09834013	MATAMBA PRIMARY SCHOOL	34.017	-8.933	01/1971	12/1998	28	52.10
73	09834016	UHENGA PRIMARY SCHOOL	34.700	-8.750	01/1974	12/1993	20	47.57
74	09834018	LYADEBWE VILLAGE	34.567	-8.767	01/1974	12/1983	10	13.39
75	09835002	IHEME	35.517	-8.017	01/1933	12/1958	26	42.94
76	09835005	DUNSA NDLE ESTATE	35.783	-8.200	01/1933	12/1960	28	44.08
77	09835007	MUFINDI FOREST STATION	35.250	-8.667	01/1927	12/1981	55	24.27
78	09835009	KILIMA (KIBWELE) ESTATE	35.333	-8.583	01/1938	12/1998	61	3.45
79	09835010	SOUTHERN HIGHLANDS CLUB	35.300	-8.350	01/1938	12/1954	17	18.13
80	09835011	MKEWE ESTATE	35.033	-8.400	01/1940	05/1978	39	22.86
81	09835013	WASA MISSION	35.250	-8.117	01/1963	12/1975	13	53.35
82	09835015	IFUENGA FARM	35.717	-8.050	01/1946	12/1949	4	0.07
83	09835016	LUGANGA	35.350	-8.283	01/1946	12/1951	6	23.60
84	09835017	ULETE MISSION	35.400	-8.117	01/1951	12/1984	34	3.70
85	09835019	IFUPIRA MUFINDI	35.433	-8.500	01/1951	12/1998	48	6.46
86	09835021	KIDOPE MUFINDI	35.250	-8.617	01/1951	12/1998	48	8.15
87	09835022	LUIGA MUFINDI	35.283	-8.617	01/1951	12/1997	47	2.84
88	09835023	LUISENGA, MUFINDI	35.583	-8.617	01/1951	12/1975	25	7.02
89	09835024	KIVERE MUFINDI	35.233	-8.633	01/1951	12/1998	48	4.01
90	09835025	IDEGE (LIVALONGE ESTATE)	35.200	-8.700	01/1951	12/1998	48	3.14

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S/no	Station code	Station name	Longitude	Latitude	Duration		No. of Years of available data	% Missing
					From	To		
91	09835026	ECHIDNA	35.383	-8.533	01/1951	12/1999	49	2.93
92	09835027	MTITU ESTATES	35.850	-8.017	01/1952	12/1958	7	15.53
93	09835030	KALINGA FOREST STATION	35.350	-8.483	01/1952	01/1979	28	24.67
94	09835033	MAFINGA BOMANI	35.333	-8.250	01/1963	12/1998	36	14.15
95	09835034	MATUGUTU ESTATE	35.350	-8.583	01/1961	12/1998	38	1.12
96	09835036	IRUNDI HILL NORTH	35.267	-8.467	01/1963	12/1998	36	31.17
97	09835039	MAFINGA NATIONAL SERVICE	35.300	-8.317	01/1967	12/1995	29	16.48
98	09835040	SAO HILL LIVESTOCK	35.300	-8.333	01/1971	12/1998	28	35.46
99	09835041	MWALASI KIBENGU	35.717	-8.267	01/1972	12/1973	2	58.55
100	09835042	SADANI PRIMARY SCHOOL	35.000	-8.250	01/1972	12/1995	24	50.83
101	09835043	KIBENGU AGRICULTURE	35.717	-8.267	01/1973	12/1981	9	34.35
102	09835044	USOKAMI PRIMARY SCHOOL	35.567	-8.217	01/1982	12/1998	17	46.67
103	09835047	MAPANDA PR SCHOOL	35.750	-8.433	01/1982	12/1992	11	16.65
104	09835050	BOMA LA NG'OMBE PR SCH	35.883	-8.217	01/1974	12/1988	15	73.96
105	09835053	DABAGA SEED FARM	35.800	-8.083	01/1978	12/1993	16	8.44
106	09836000	IFAKARA MISSION	36.650	-8.150	01/1926	11/1980	55	8.20
107	09836001	MAHENGHE HOSPITAL	36.717	-8.683	01/1921	08/1995	75	7.37
108	09836002	KWIRO MISSION	36.667	-8.667	01/1933	12/1994	62	5.01
109	09836003	RUAHA MISSION	36.733	-8.900	01/1938	12/1993	56	3.88
110	09836004	SOFI AGR. STATION	36.283	-8.950	01/1939	12/1977	39	21.39
111	09836006	MALINYA H/MET (KIPINGO)	36.133	-8.933	01/1981	12/1983	3	52.88
112	09836011	MTIMBIRA MISSION	36.367	-8.783	01/1966	12/1993	28	7.79
113	09838002	UTETE AGRICULTURE	38.750	-8.017	01/1922	12/1998	77	4.34
114	09839001	KIBATA	39.000	-8.450	01/1924	05/1930	7	7.81
115	09839003	MOHORO	39.183	-8.133	01/1938	06/1966	29	4.39
116	09839004	KILWA MASOKO	39.517	-8.917	01/1949	12/2000	52	12.24
117	09933000	MUSEKERA ESTATE	33.683	-9.333	01/1925	12/1998	74	21.54
118	09933002	TUKUYU AGRICULTURE	33.633	-9.250	01/1921	12/1998	78	1.64
119	09933004	RUNGWE TEA ESTATE	33.583	-9.167	01/1934	12/1998	65	17.94
120	09933005	MWITIKA ESTATE	33.717	-9.367	01/1934	12/1989	56	13.21
121	09933007	TUKUYU HOSPITAL	33.633	-9.250	01/1939	12/1994	56	10.01

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S/no	Station code	Station name	Longitude	Latitude	Duration		No. of Years of available data	% Missing
					From	To		
122	09933010	KYELA BOMA	33.850	-9.583	01/1939	12/1994	56	4.37
123	09933011	MAKETE LEPROSY HOSPITAL	33.667	-9.383	01/1942	10/1994	53	4.09
124	09933013	RUNGWE SECONDARY SCHOOL	33.600	-9.167	01/1949	05/1972	24	49.51
125	09933020	NJUGILO	33.800	-9.467	01/1957	05/1990	34	7.96
126	09933022	MWAKALELI MIDDLE SCHOOL	33.833	-9.000	01/1959	04/1962	4	22.62
127	09933023	KIGANGA TEA ESTATE	33.700	-9.333	01/1959	04/1965	7	9.13
128	09933024	KIWIRA PRIMARY SCHOOL	33.550	-9.167	01/1958	07/1991	34	14.94
129	09933025	ISANGOTE PRIMARY SCHOOL	33.133	-9.183	01/1963	12/1994	32	16.32
130	09933028	IGEMBE PRIMARY SCHOOL	33.450	-9.060	01/1961	12/1999	39	52.43
131	09933029	NDALA	33.767	-9.150	01/1961	12/1995	35	43.62
132	09933031	SANTILYA PRIMARY SCHOOL	33.500	-9.000	01/1965	12/1998	34	16.19
133	09933033	KIWIRA FOREST	33.700	-9.050	01/1965	12/1995	31	18.34
134	09934000	MILO MISSION	34.617	-9.883	01/1921	12/1960	40	7.33
135	09934001	NJOMBE DISTRIC OFFICE	34.767	-9.333	01/1926	12/1991	66	3.67
136	09934008	KIPENGERE PRIMARY SCHOOL	34.433	-9.300	01/1941	12/1995	55	19.91
137	09934009	MADUNDA MISSION	34.467	-9.867	01/1941	04/1976	36	7.09
138	09934010	LUGALAWA PRIMARY SCHOOL	34.683	-9.817	01/1941	12/1967	27	4.94
139	09934011	BULONGWA HYDROMET	34.067	-9.333	01/1978	12/1992	15	63.33
140	09934013	LUPONDE FARM	34.667	-9.567	01/1942	12/1998	57	0.75
141	09934015	NJOMBE WATTLE ESTATE	34.750	-9.417	01/1950	12/1998	49	2.73
142	09934018	TANGANYIKA WATTLE NO.1	34.867	-9.233	01/1954	12/1998	45	11.66
143	09934019	TANGANYIKA WATTLE NO. 11	34.833	-9.250	01/1954	12/1998	45	11.00
144	09934020	TANGANYIKA WATTLE NO.111	34.767	-9.233	01/1954	12/1998	45	36.35
145	09934021	TANGANYIKA WATTLE NO. IV	34.833	-9.167	01/1954	12/1998	45	6.69
146	09934022	TANGANYIKA WATTLE NO. V	34.650	-9.267	01/1954	12/1998	45	7.45
147	09934023	DANSLAND FARM	34.633	-9.600	01/1954	12/1998	45	2.77
148	09934024	ICHENGA	34.783	-9.500	01/1957	12/1998	42	4.34
149	09934025	TANDALA	34.750	-9.500	01/1958	12/1962	5	33.24
150	09934026	LUSITU FARM	34.717	-9.700	01/1955	12/1998	44	5.58
151	09934027	HELVETIA FARM	34.667	-9.583	01/1960	12/1998	39	38.47
152	09934029	IGERI AGROMET	34.667	-9.667	01/1989	12/1998	10	1.62

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S/no	Station code	Station name	Longitude	Latitude	Duration		No. of Years of available data	% Missing
					From	To		
153	09934032	IGOSI VILLAGE	34.500	-9.450	01/1970	12/1996	27	59.54
154	09934034	WANGAMA	34.817	-9.050	01/1972	12/1994	23	52.55
155	09934038	MAHALULE	34.867	-9.217	01/1975	12/1996	22	51.51
156	09934039	KILOLELO FARM	34.783	-9.183	01/1975	12/1996	22	18.63
157	09934049	MAKETE BOMANI	34.233	-9.333	01/1984	12/1998	15	5.07
158	09935002	IFINGA MISSION	35.483	-9.500	01/1940	12/1982	43	14.92
159	09935003	KIFANYA MISSION	35.133	-9.517	01/1940	12/1998	59	26.31
160	09935004	LUPEMBE ESTATE	35.283	-9.283	01/1941	12/1997	57	15.38
161	09935005	MATEMBWE MISSION	35.150	-9.250	01/1941	12/1990	50	18.84
162	09935006	MAHANJE MISSION	35.033	-9.917	01/1934	12/1994	61	2.73
163	09935007	TAVETA MISSION	35.517	-9.017	01/1942	12/1998	57	15.98
164	09935009	UKALAWA TEA	35.167	-9.167	01/1972	12/1995	24	22.26
165	09935012	MASIGIRA	35.250	-9.933	01/1975	12/1995	21	0.39
166	09935014	MADABA MAJI	35.400	-9.933	01/1977	12/1995	19	25.42

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Appendix A2.2: List of Rainfall Stations that Contribute to Catchments within the Kilombero Sub-Basin in Estimating Average Rainfall using Thiessen Polygon Method

Catchment with its delineated area	Rainfall Stations Contributing to Catchment	Thiessen Polygon Weight to the Catchment
1kb8 (2,733 km ²) 14 Rainfall Stations	09835005	0.027003
	09835009	0.019023
	09835019	0.126953
	09835021	0.005444
	09835022	0.011033
	09835023	0.363688
	09835026	0.029402
	09835030	0.017883
	09835034	0.061763
	09835041	0.027003
	09835043	0.027003
	09835044	0.045092
	09835047	0.103657
	09935007	0.131253
1kb10 (11,094 km ²) 24 Rainfall Stations	09836004	0.035455
	09836006	0.110876
	09934001	0.018630
	09934013	0.004395
	09934015	0.004395
	09934018	0.022245
	09934019	0.009436
	09934020	0.007779
	09934022	0.003235
	09934023	0.004395
	09934024	0.004395
	09934025	0.004395
	09934027	0.004395
	09934032	0.004395
	09934038	0.011112
	09934039	0.001016
	09935002	0.183944
	09935003	0.038488
	09935004	0.046207
	09935005	0.031972
09935006	0.183944	
09935007	0.042343	
09935012	0.038488	
09935014	0.183944	
Intervening Catchment of 1kb4 excluding 1kb8 and 1kb10 (6,153 km ²) 18 Rainfall Stations	09834001	0.044862
	09834005	0.073526
	09835007	0.044288
	09835021	0.006664
	09835022	0.007797
	09835024	0.022696
	09835025	0.147636
09835034	0.006536	
09835036	0.000795	

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Catchment with its delineated area	Rainfall Stations Contributing to Catchment	Thiessen Polygon Weight to the Catchment
Intervening Catchment of 1kb4 continues	09836006	0.080956
	09934021	0.021462
	09934034	0.037649
	09934038	0.007376
	09934039	0.000957
	09935004	0.047132
	09935005	0.015173
	09935007	0.280441
	09935009	0.151520
1kb15 (330 km ²)	09835050	1.000000
1kb14a (597 km ²)	09736004	0.220623
	09736016	0.220623
	09836000	0.555424
Intervening Catchment of 1kb17 excluding 1kb4, 1kb14a and 1kb15 (11,289 km ²) 14 Rainfall Stations	09835005	0.001341
	09835023	0.029989
	09835041	0.001341
	09835043	0.001341
	09835047	0.100027
	09835050	0.122651
	09836000	0.186408
	09836001	0.004271
	09836002	0.104251
	09836003	0.014036
	09836004	0.122953
	09836006	0.133446
	09836011	0.174417
	09935007	0.002656

Appendix A2.3: Monthly Correlation Results Among Rainfall Stations

Catchment 1kb8 (14 Rainfall Gauging Stations)

09835005	09835009	09835019	09835021	09835022	09835023	09835026	09835030	09835034	09835041	09835043	09835044	09835047	09935007
09835005	09835009	09835019	09835021	09835022	09835023	09835026	09835030	09835034	09835041	09835043	09835044	09835047	09935007
1	0.73	0.85	0.78	0.75	0.72	0.88	0.84	-9.9	-9.9	-9.9	-9.9	-9.9	0.79
09835009	0.73	1	0.84	0.93	0.75	0.96	0.78	0.78	0.97	0.85	0.64	0.7	0.73
09835019	0.85	0.84	1	0.83	0.69	0.82	0.84	0.89	0.87	0.92	0.72	0.64	0.68
09835021	0.78	0.93	0.83	1	0.76	0.95	0.76	0.74	0.93	0.86	0.56	0.71	0.75
09835022	0.75	0.69	0.76	0.76	1	0.79	0.61	0.61	0.83	0.9	0.59	0.58	0.57
09835023	0.72	0.96	0.82	0.95	0.79	1	0.85	0.73	0.94	-9.9	-9.9	0.82	0.82
09835026	0.88	0.78	0.76	0.61	0.85	1	0.89	0.77	0.99	0.69	0.58	0.57	0.65
09835030	0.84	0.78	0.89	0.74	0.61	0.73	0.89	1	0.74	0.54	-9.9	0.69	0.69
09835034	-9.9	0.97	0.87	0.93	0.83	0.94	0.77	0.74	1	0.87	0.67	0.68	0.68
09835041	-9.9	-9.9	-9.9	-9.9	-9.9	-9.9	-9.9	1	-9.9	-9.9	-9.9	-9.9	-9.9
09835043	-9.9	0.85	0.92	0.86	0.8	-9.9	0.69	0.54	0.87	-9.9	1	0.44	0.58
09835044	-9.9	0.64	0.72	0.56	0.59	-9.9	0.58	-9.9	0.67	-9.9	1	0.44	0.67
09835047	-9.9	0.7	0.64	0.71	0.58	-9.9	0.57	-9.9	0.68	-9.9	0.44	1	0.41
09935007	0.79	0.73	0.68	0.75	0.57	0.82	0.65	0.69	0.68	-9.9	0.58	0.67	0.41

Catchment 1kb10 (24 Rainfall Gauging Stations)

09836004	09836006	09934001	09934013	09934015	09934018	09934019	09934020	09934022	09934023	09934024	09934025	09934027	09934032	09934038	09934039	09935002	09935003	09935004	09935005	09935006	09935007	09935012	09935014
09836004	09836006	09934001	09934013	09934015	09934018	09934019	09934020	09934022	09934023	09934024	09934025	09934027	09934032	09934038	09934039	09935002	09935003	09935004	09935005	09935006	09935007	09935012	09935014
1	-9.9	0.14	0.81	0.77	0.8	0.8	0.79	0.72	0.65	0.77	0.68	0.76	0.67	0.8	0.8	0.73	0.71	0.84	0.82	0.83	0.85	0.86	-9.9
09836006	-9.9	0.79	0.78	0.73	0.86	0.78	0.63	0.66	0.81	0.73	-9.9	0.86	-9.9	-9.9	0.72	0.72	-9.9	0.84	0.76	0.81	0.78	0.84	0.77
09934001	0.14	1	0.87	0.95	0.9	0.91	0.91	0.92	0.79	0.91	0.63	0.88	0.87	0.81	0.89	0.64	0.73	0.83	0.8	0.8	0.68	0.83	0.82
09934013	0.81	0.79	1	0.9	0.88	0.88	0.86	0.86	0.8	0.92	0.74	0.94	0.84	0.77	0.85	0.66	0.72	0.85	0.8	0.83	0.73	0.84	0.84
09934015	0.77	0.95	0.9	1	0.94	0.92	0.92	0.92	0.77	0.92	0.66	0.9	0.84	0.91	0.7	0.7	0.74	0.86	0.8	0.82	0.67	0.84	0.84
09934018	0.8	0.86	0.9	0.88	0.94	1	0.94	0.91	0.76	0.9	0.7	0.89	0.83	0.86	0.89	0.72	0.87	0.77	0.77	0.82	0.66	0.81	0.84
09934019	0.8	0.78	0.91	0.88	0.92	0.94	1	0.92	0.72	0.89	0.64	0.85	0.82	0.9	0.89	0.74	0.73	0.85	0.75	0.8	0.7	0.85	0.83
09934020	0.79	0.63	0.91	0.86	0.92	0.91	0.9	0.9	0.74	0.88	-9.9	0.85	0.84	0.8	0.92	0.67	0.7	0.69	0.79	0.54	0.75	0.78	0.78
09934022	0.72	0.66	0.92	0.86	0.92	0.91	0.9	1	0.71	0.88	0.58	0.86	0.83	0.8	0.86	0.66	0.68	0.78	0.77	0.77	0.58	0.77	0.77
09934023	0.65	0.81	0.79	0.8	0.77	0.76	0.72	0.74	1	0.77	0.72	0.79	0.68	0.61	0.76	0.65	0.8	0.73	0.69	0.76	0.63	0.75	0.79
09934024	0.77	0.73	0.91	0.92	0.92	0.9	0.88	0.88	0.77	1	0.66	0.94	0.84	0.84	0.9	0.71	0.72	0.86	0.78	0.81	0.66	0.86	0.87
09934025	0.68	-9.9	0.63	0.74	0.66	0.7	0.64	-9.9	0.58	0.72	1	-9.9	-9.9	-9.9	-9.9	0.63	0.59	0.66	0.63	0.66	0.71	-9.9	-9.9
09934027	0.76	0.86	0.88	0.94	0.9	0.89	0.85	0.85	0.86	0.79	0.94	1	0.84	0.78	0.88	0.72	0.68	0.84	0.74	0.87	0.66	0.86	0.85
09934032	0.67	-9.9	0.87	0.84	0.84	0.83	0.82	0.84	0.83	0.68	0.84	-9.9	1	0.86	0.8	0.57	0.65	0.72	0.66	0.7	0.53	0.77	0.81
09934038	0.8	-9.9	0.81	0.77	0.84	0.86	0.9	0.8	0.61	0.84	-9.9	0.78	0.86	1	0.84	-9.9	0.65	0.74	0.65	0.73	0.49	0.74	0.75
09934039	0.8	0.72	0.89	0.85	0.91	0.89	0.89	0.92	0.86	0.76	0.9	0.88	0.8	0.84	1	0.62	0.71	0.81	0.7	0.77	0.53	0.8	0.82
09935002	0.73	0.72	0.64	0.66	0.7	0.72	0.74	0.67	0.66	0.65	0.71	0.63	0.57	-9.9	0.62	1	0.78	0.75	0.65	0.61	0.73	0.81	0.71
09935003	0.71	-9.9	0.73	0.72	0.74	0.72	0.73	0.7	0.68	0.8	0.72	0.59	0.68	0.65	0.71	0.78	1	0.74	0.71	0.67	0.63	0.75	0.73
09935004	0.84	0.84	0.83	0.85	0.86	0.77	0.85	0.79	0.78	0.73	0.86	0.66	0.72	0.74	0.81	0.75	0.74	1	0.81	0.81	0.8	0.86	0.88
09935005	0.82	0.76	0.8	0.8	0.8	0.77	0.75	0.69	0.77	0.63	0.74	0.84	0.66	0.65	0.7	0.65	0.71	0.81	0.73	0.73	0.71	0.64	0.71
09935006	0.83	0.81	0.8	0.83	0.82	0.82	0.8	0.79	0.77	0.76	0.66	0.87	0.7	0.73	0.77	0.61	0.67	0.81	0.73	1	0.73	0.91	0.89
09935007	0.85	0.78	0.68	0.73	0.67	0.66	0.7	0.54	0.58	0.63	0.66	0.71	0.53	0.49	0.53	0.73	0.63	0.8	0.71	0.73	1	0.61	0.67
09935012	0.86	0.84	0.83	0.84	0.84	0.81	0.85	0.75	0.77	0.75	0.86	-9.9	0.77	0.74	0.8	0.81	0.75	0.86	0.64	0.91	0.61	1	0.85
09935014	-9.9	0.77	0.82	0.84	0.84	0.84	0.83	0.78	0.77	0.87	-9.9	0.85	0.81	0.75	0.82	0.71	0.73	0.88	0.71	0.89	0.67	0.85	1

Note: -9.9 implies there was no concurrent data among the stations

Appendix A2.3 Continued

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Intervening Catchment of Ikb4 (18 Rainfall Gauging Stations)

09834001	09834005	09835007	09835021	09835022	09835024	09835025	09835034	09835036	09836006	09934021	09934034	09934038	09934039	09935004	09935005	09935007	09935009
0.87	0.87	0.47	0.58	0.44	0.58	0.48	0.6	0.81	0.79	0.78	0.75	0.59	0.79	0.69	0.72	0.54	0.56
1	0.87	0.59	0.71	0.65	0.69	0.72	0.75	-9.9	-9.9	0.93	-9.9	-9.9	-9.9	0.8	0.87	0.69	-9.9
0.47	0.59	1	0.83	0.53	0.85	0.49	0.76	0.42	-9.9	0.53	0.59	0.55	0.68	0.64	0.63	0.72	0.79
0.58	0.71	0.83	1	0.76	0.94	0.72	0.93	0.62	0.91	0.68	0.64	0.62	0.66	0.76	0.68	0.75	0.68
0.65	0.76	0.53	0.76	1	0.8	0.88	0.83	0.49	0.91	0.56	0.6	0.61	0.62	0.59	0.54	0.57	0.69
0.69	0.85	0.85	0.94	0.8	1	0.77	0.93	0.68	0.86	0.71	0.69	0.69	0.74	0.77	0.68	0.73	0.81
0.72	0.49	0.72	0.88	0.77	1	0.75	0.54	0.81	0.81	0.59	0.65	0.56	0.66	0.62	0.58	0.58	0.72
0.75	0.75	0.76	0.93	0.83	0.93	0.75	1	0.7	0.76	0.74	0.67	0.69	0.74	0.75	0.63	0.68	0.75
-9.9	-9.9	0.42	0.62	0.49	0.68	0.54	0.7	1	0.65	0.8	0.79	0.72	0.78	0.72	0.69	0.53	0.62
-9.9	-9.9	0.91	0.91	0.86	0.81	0.76	0.65	1	0.71	0.71	-9.9	-9.9	0.71	0.84	0.77	0.73	0.81
0.93	0.53	0.68	0.68	0.56	0.71	0.59	0.74	0.8	0.71	1	0.84	0.86	0.93	0.81	0.75	0.6	0.69
-9.9	-9.9	0.59	0.64	0.6	0.69	0.65	0.67	0.79	-9.9	0.84	1	0.77	0.87	0.71	0.7	0.51	0.67
-9.9	-9.9	0.55	0.62	0.61	0.69	0.56	0.69	0.72	-9.9	0.86	0.77	1	0.84	0.74	0.65	0.49	0.72
-9.9	-9.9	0.68	0.66	0.62	0.74	0.66	0.74	0.78	0.71	0.93	0.87	0.84	1	0.81	0.7	0.53	0.72
0.69	0.8	0.64	0.76	0.59	0.77	0.62	0.75	0.72	0.84	0.81	0.71	0.74	0.81	1	0.8	0.8	0.8
0.87	0.63	0.68	0.54	0.68	0.58	0.63	0.63	0.69	0.77	0.75	0.7	0.65	0.7	0.8	1	0.71	0.55
0.69	0.72	0.75	0.57	0.73	0.58	0.68	0.68	0.53	0.73	0.6	0.51	0.49	0.53	0.8	0.71	1	0.62
-9.9	-9.9	0.79	0.68	0.69	0.81	0.72	0.75	0.62	0.81	0.69	0.67	0.72	0.72	0.8	0.55	0.62	1

Intervening Catchment of Ikb17 (14 Rainfall Gauging Stations)

09835005	09835023	09835041	09835043	09835047	09835050	09836000	09836001	09836002	09836003	09836004	09836006	09836011	09935007
0.72	0.72	-9.9	-9.9	-9.9	0.74	0.25	0.83	0.82	0.83	0.83	-9.9	-9.9	0.79
1	1	-9.9	0.8	-9.9	-9.9	0.86	0.16	0.78	0.61	0.81	-9.9	-9.9	0.82
-9.9	-9.9	1	-9.9	-9.9	-9.9	-9.9	-9.9	-9.9	-9.9	-9.9	-9.9	-9.9	-9.9
0.72	0.72	0.8	0.8	0.77	0.64	0.31	0.68	0.7	0.68	0.68	-9.9	0.67	0.65
-9.9	-9.9	1	-9.9	-9.9	-9.9	0.27	0.51	0.71	-9.9	-9.9	0.78	0.63	0.43
-9.9	-9.9	-9.9	0.77	-9.9	1	-9.9	0.06	0.75	0.81	-9.9	-9.9	0.91	0.74
0.74	0.86	-9.9	0.64	-9.9	1	0.76	0.79	0.69	0.83	0.83	-9.9	0.84	0.84
0.25	0.16	-9.9	0.31	0.27	0.06	1	0.77	0.76	0.84	0.84	0.78	0.81	0.63
0.83	0.78	-9.9	0.68	0.51	0.75	0.79	1	0.66	0.84	0.84	0.62	0.75	0.75
0.82	0.61	-9.9	0.7	0.71	0.81	0.69	0.76	0.66	0.74	0.74	0.84	0.78	0.62
0.83	0.81	-9.9	0.68	-9.9	-9.9	0.83	0.84	0.84	1	1	-9.9	0.83	0.85
-9.9	-9.9	-9.9	0.78	-9.9	-9.9	0.78	0.62	0.84	-9.9	-9.9	1	0.82	0.71
-9.9	0.82	-9.9	0.67	0.63	0.91	0.84	0.81	0.75	0.83	0.83	0.82	1	0.7
0.79	0.82	-9.9	0.65	0.43	0.74	0.84	0.63	0.75	0.62	0.85	0.71	0.7	1

Note: -9.9 implies there was no concurrent data among the stations

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Appendix A2.4: Listing of the time of the Onset and Cessation; Average Duration and Magnitude of rainfall at each rain gauge station

No.	Station	Onset	Cessation	Duration	Long Rains (mm)	Mean Annual Rainfall (mm)
1	09536004	32	12	17	546.97	580.39
2	09536017	32	12	17	529.21	573.63
3	09635001	33	11	15	526.14	566.35
4	09635010	33	12	16	518.32	559.06
5	09635011	33	11	15	573.97	630.01
6	09635012	33	11	15	506.99	545.02
7	09635014	33	11	15	502.66	537.33
8	09635026	31	11	17	611.63	632.80
9	09636000	34	13	16	619.74	691.10
10	09636006	33	14	18	694.25	763.33
11	09636008	33	12	16	632.93	705.14
12	09636013	33	12	16	564.51	593.75
13	09636018	30	15	22	1364.73	1634.72
14	09636020	33	11	15	482.54	529.96
15	09636026	33	15	19	526.40	581.42
16	09636027	32	15	20	1178.65	1357.06
17	09636029	34	12	15	418.73	477.39
18	09733000	33	12	16	875.15	957.34
19	09733002	32	11	16	883.09	950.00
20	09734000	33	12	16	602.50	665.60
21	09734001	33	11	15	528.52	583.92
22	09735002	33	12	16	589.11	648.21
23	09735003	33	12	16	594.13	656.50
24	09735004	32	12	17	377.49	397.48
25	09735007	33	12	16	672.12	737.71
26	09735008	33	12	16	572.93	620.34
27	09735013	33	12	16	576.01	621.09
28	09735014	33	12	16	666.15	732.16
29	09735015	32	12	17	704.58	745.25
30	09736003	33	12	16	558.91	628.05
31	09736004	36	15	16	1357.87	1768.15
32	09736006	33	12	16	347.78	402.05
33	09736007	30	13	20	909.49	1021.35
34	09736008	32	13	18	909.76	1062.71
35	09736012	34	11	14	540.93	656.44
36	09736016	32	14	19	1244.97	1405.52
37	09736017	33	11	15	747.03	795.49
38	09737000	31	14	20	974.41	1125.40
39	09737005	33	15	19	1340.36	1608.87

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No.	Station	Onset	Cessation	Duration	Long Rains (mm)	Mean Annual Rainfall (mm)
40	09737006	31	15	21	1545.41	1937.16
41	09737008	34	14	17	799.42	968.90
42	09737011	32	14	19	1157.52	1309.49
43	09737013	31	15	21	2223.65	2480.36
44	09737014	32	13	18	951.06	1230.99
45	09738000	26	8	19	737.02	830.25
46	09738004	32	13	18	884.85	1051.64
47	09738018	30	15	22	735.16	820.83
48	09833000	32	12	17	537.33	584.49
49	09833001	32	12	17	871.76	938.72
50	09833002	33	10	14	781.45	866.68
51	09833003	34	12	15	965.74	1103.07
52	09833010	33	13	17	1864.46	2073.70
53	09833015	33	12	16	1152.13	1271.58
54	09833020	33	12	16	862.03	964.22
55	09833025	33	13	17	942.42	1046.10
56	09834000	33	12	16	648.79	724.81
57	09834001	32	10	15	733.98	805.31
58	09834002	34	11	14	722.24	825.86
59	09834003	33	11	15	579.27	622.87
60	09834004	34	10	13	616.73	695.34
61	09834005	34	12	15	759.79	832.23
62	09834006	33	11	15	675.93	730.98
63	09834008	33	11	15	585.29	634.10
64	09834010	33	11	15	719.63	793.17
65	09834011	33	11	15	668.37	720.63
66	09834012	33	10	14	584.44	658.52
67	09834013	33	12	16	887.70	1036.06
68	09834016	32	10	15	459.81	489.94
69	09834018	33	13	17	463.36	502.13
70	09835002	32	12	17	785.93	842.70
71	09835005	33	13	17	984.36	1082.15
72	09835007	34	14	17	1655.16	1892.03
73	09835009	33	14	18	1254.68	1421.49
74	09835010	32	10	15	710.58	787.49
75	09835011	32	11	16	891.20	987.10
76	09835013	33	12	16	981.84	1134.61
77	09835015	33	13	17	622.95	687.33
78	09835016	33	10	14	614.72	711.85
79	09835017	33	12	16	881.24	965.54
80	09835019	33	13	17	1151.64	1293.78

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No.	Station	Onset	Cessation	Duration	Long Rains (mm)	Mean Annual Rainfall (mm)
81	09835021	34	14	17	1240.04	1461.17
82	09835022	34	15	18	2238.13	2634.58
83	09835023	34	14	17	1484.62	1730.71
84	09835024	32	14	19	1537.64	1711.64
85	09835025	32	14	19	2669.03	2942.55
86	09835026	33	13	17	1088.29	1223.43
87	09835027	35	13	15	641.23	706.88
88	09835030	34	13	16	912.17	1045.48
89	09835033	32	11	16	876.75	954.09
90	09835034	33	15	19	1190.70	1331.88
91	09835036	32	12	17	846.46	905.33
92	09835039	32	12	17	806.57	852.46
93	09835040	33	11	15	733.39	828.70
94	09835042	32	13	18	744.24	826.52
95	09835043	34	13	16	816.70	933.56
96	09835044	32	11	16	1236.42	1339.25
97	09835047	31	15	21	1135.71	1240.09
98	09835050	32	14	19	1216.26	1350.81
99	09835053	32	11	16	703.58	779.89
100	09836000	34	14	17	1173.50	1333.09
101	09836001	33	13	17	1695.33	1960.22
102	09836002	33	13	17	1556.76	1828.05
103	09836003	33	13	17	1113.82	1258.66
104	09836004	34	13	16	1061.98	1212.05
105	09836006	30	12	19	784.25	1048.25
106	09836011	32	13	18	1145.77	1254.73
107	09838002	31	14	20	779.14	875.93
108	09839004	32	14	19	889.43	1007.17
109	09933000	32	15	20	1996.28	2395.46
110	09933002	32	15	20	2025.98	2432.94
111	09933004	32	14	19	1727.29	2071.94
112	09933005	32	15	20	1927.05	2290.15
113	09933007	32	15	20	1969.24	2394.25
114	09933010	33	15	19	2317.94	2721.91
115	09933011	32	15	20	2117.75	2419.79
116	09933013	32	15	20	1661.13	1916.54
117	09933020	35	15	17	1686.80	2144.10
118	09933022	33	13	17	604.03	753.64
119	09933023	34	13	16	2031.10	2546.19
120	09933024	32	14	19	1588.27	1885.57
121	09933025	32	15	20	1352.38	1556.35

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No.	Station	Onset	Cessation	Duration	Long Rains (mm)	Mean Annual Rainfall (mm)
122	09933028	31	15	21	989.33	1145.87
123	09933029	32	15	20	1898.48	2166.18
124	09933031	33	12	16	912.30	1017.43
125	09933033	30	12	19	2017.47	2254.95
126	09934000	32	13	18	2457.91	2662.70
127	09934001	33	12	16	980.84	1078.92
128	09934008	33	12	16	1544.86	1766.58
129	09934009	33	13	17	725.89	815.69
130	09934010	33	13	17	1055.27	1159.06
131	09934011	31	13	19	1471.86	1586.87
132	09934013	33	12	16	1121.94	1275.30
133	09934015	32	12	17	1079.93	1170.14
134	09934018	32	13	18	1050.91	1132.30
135	09934019	32	12	17	943.25	1027.20
136	09934020	32	12	17	911.45	988.43
137	09934021	32	12	17	1004.33	1078.66
138	09934022	33	11	15	912.98	1026.54
139	09934023	32	13	18	2080.96	2281.33
140	09934024	32	12	17	1239.09	1355.49
141	09934025	33	12	16	1965.20	2160.26
142	09934026	33	13	17	1255.29	1399.32
143	09934027	32	13	18	1248.28	1360.11
144	09934029	34	13	16	2053.69	2294.47
145	09934032	32	11	16	938.29	1051.36
146	09934034	34	13	16	772.66	911.75
147	09934038	33	12	16	914.17	1013.36
148	09934039	32	12	17	920.82	992.37
149	09934049	30	13	20	1545.19	1659.70
150	09935002	32	13	18	1013.82	1115.12
151	09935003	32	13	18	1932.06	2078.25
152	09935004	31	13	19	1638.85	1825.74
153	09935005	32	13	18	1454.80	1580.66
154	09935006	32	13	18	1220.54	1294.30
155	09935007	32	13	18	1213.15	1366.83
156	09935009	32	13	18	1987.69	2292.79
157	09935012	32	13	18	3269.62	3478.81
158	09935014	32	13	18	3101.96	3355.17
159	09933007	32	15	20	1969.24	2394.25

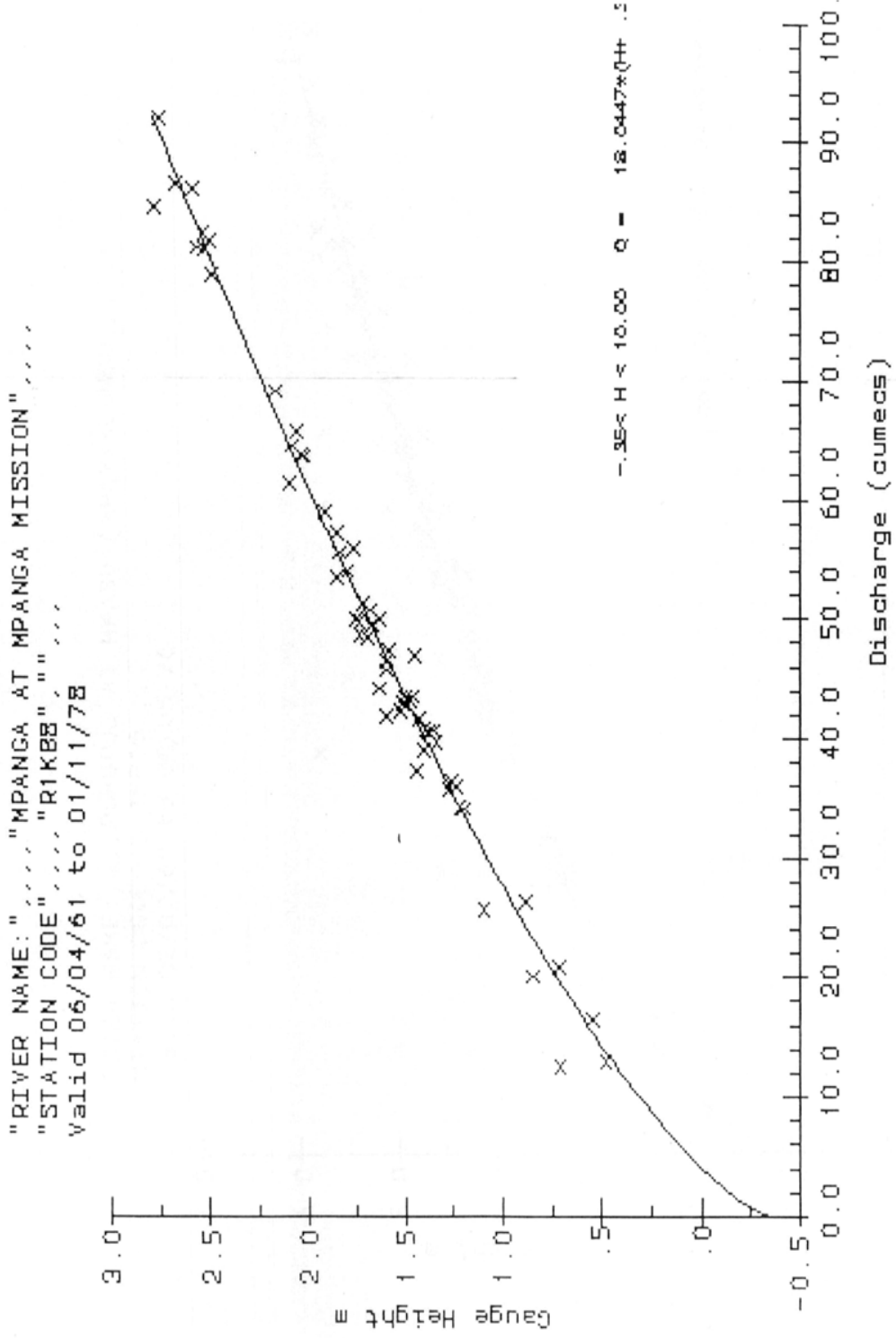
Appendix A4.1: Flow gauging stations in the Rufiji River Basin in WREP database

No.	Station Code	Start Year	End year	Record length (years)	No. of data points	% of missing data	Daily mean flow (m ³ /s)	Catchment Area (km ²)
1	1k3	1954	1989	36	12,935	17.1	808.28	177,000
2	1ka2a	1954	1984	31	11,413	9.4	20.71	2,195.3
3	1ka3	1954	1985	32	11,869	39.4	160.28	80,040
4	1ka5	1954	1979	26	9,770	7.5	117.79	67,884
5	1ka7a	1962	1993	32	11,931	21.3	3.43	166.03
6	1ka8a	1954	1993	40	14,822	17.9	19.86	802.7
7	1ka9	1954	1994	41	14,975	9.0	5.94	441.8
8	1ka10a	1956	1988	33	12,388	22.2	3.49	247.1
9	1ka11a	1955	1993	39	14,518	13.6	21.33	1,600
10	1ka12	1956	1993	38	13,880	11.2	3.93	348.2
11	1ka15a	1956	1988	33	12,358	6.0	6.05	1,393.7
12	1ka16	1956	1989	34	12,631	36.9	1.67	81.24
13	1ka21a	1957	1993	37	13,604	7.1	18.29	2,609.4
14	1ka22	1957	1988	32	12,022	4.3	4.01	455.74
15	1ka23a	1959	1982	24	8,917	19.1	1.40	308.2
16	1ka27	1956	1988	33	12,054	14.0	63.11	20,123.04
17	1ka31	1956	1993	38	13,880	8.7	50.97	6,837.9
18	1ka32	1957	1988	32	11,931	17.6	4.00	781.2
19	1ka32a	1957	1990	34	12,418	16.1	4.06	781.9
20	1ka33b	1957	1989	33	12,234	23.1	8.03	2,190
21	1ka37a	1957	1994	38	13,879	4.4	25.60	2,992.41
22	1ka38	1958	1986	29	10,773	17.7	3.72	704.95
23	1ka39a	1957	1988	32	11,961	8.9	12.79	1,810.2
24	1ka41	1957	1991	35	12,874	59.1	17.94	8,945.2
25	1ka42	1957	1995	39	14,244	57.3	50.65	25,628.3
26	1ka45	1956	1989	34	13,361	24.6	65.24	45.3
27	1ka50a	1958	1994	37	13,514	9.0	0.93	107.2
28	1ka51a	1959	1994	36	13,149	5.8	0.71	64.2
29	1ka56	1961	1982	22	8,216	14.1	1.19	165.4
30	1ka58a	1961	1975	15	5,478	9.9	1.12	-
31	1ka59	1954	1998	45	16,436	37.7	72.93	24,320
32	1ka61	1965	1988	22	8,125	14.3	139.95	78,400

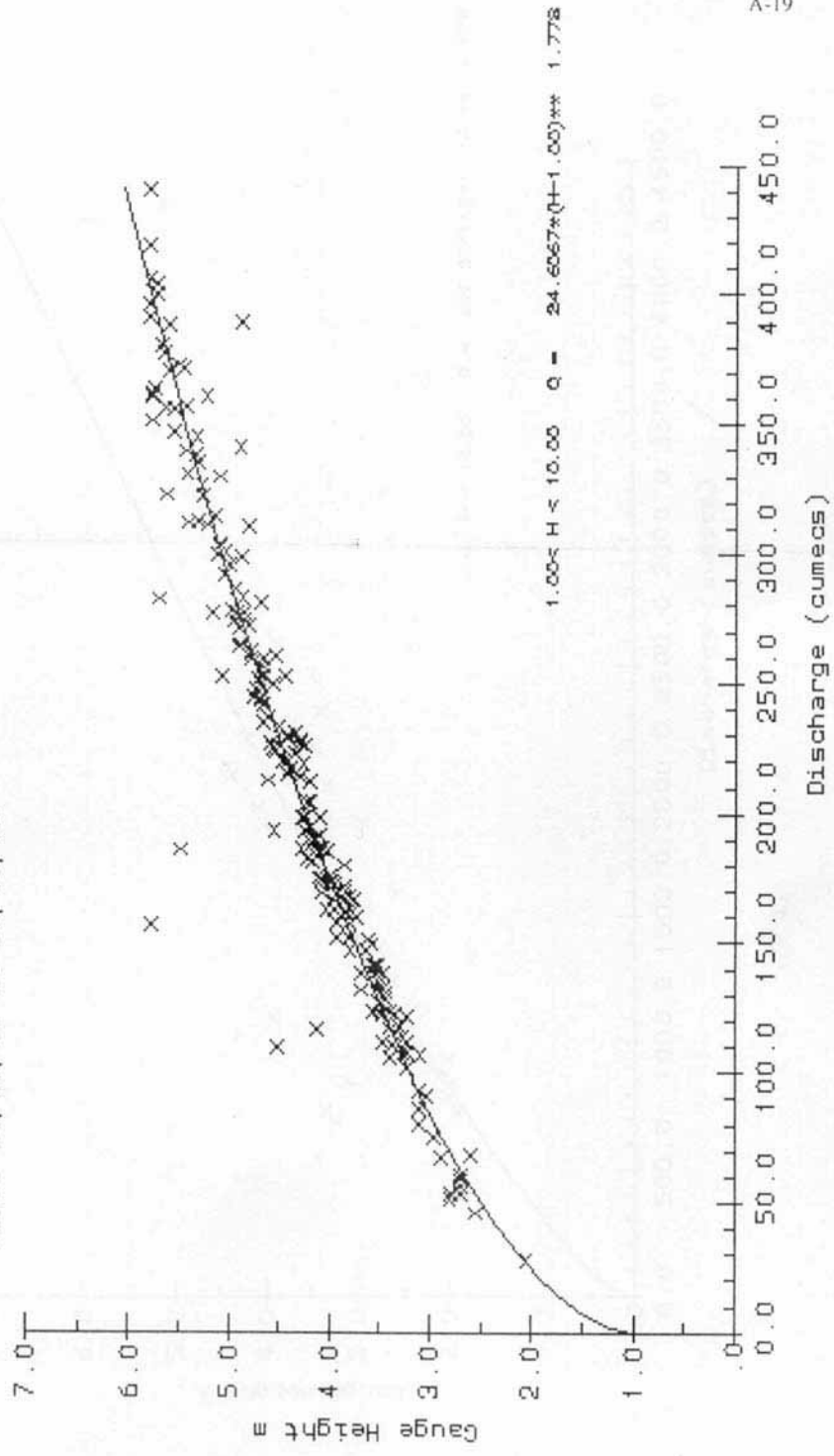
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No.	Station Code	Start Year	End year	Record length (years)	No. of data points	% of missing data	Daily mean flow (m ³ /s)	Catchment Area (km ²)
33	lka63	1974	1985	12	4,717	74.5	2.28	-
34	lkb4	1955	1982	28	10,347	38.9	205.23	20,015
35	lkb8	1956	1990	35	13,057	23.2	39.91	2,585
36	lkb9	1956	1989	34	12,570	24.6	65.24	5,625.6
37	lkb10	1960	1987	28	10,318	23.2	221.87	14,361.7
38	lkb14	1958	1988	31	11,566	0.6	5.60	598
39	lkb15	1958	1982	25	9,251	21.0	19.34	304.8
40	lkb15a	1960	1989	30	11,139	3.5	22.22	328.7
41	lkb17	1957	1984	28	10,227	25.8	519.44	33,066
42	lkb18a	1958	1972	15	5,660	12.9	4.36	377.7
43	lkb18b	1976	1990	15	5,630	29.0	7.60	529.1
44	lkb19	1961	1988	28	10,531	6.7	3.72	331.1
45	lkb20	1960	1969	10	3,957	9.4	2.25	95
46	lkb23	1962	1986	25	9,131	14.8	0.99	314.1
47	lkb24	1961	1986	26	9,677	12.1	0.86	38.8
48	lkb26	1966	1988	23	8,491	14.2	2.44	92.2
49	lkb27	1976	1989	14	5,357	75.2	41.09	-
50	lkb28	1974	1991	18	6,909	22.7	1.01	-

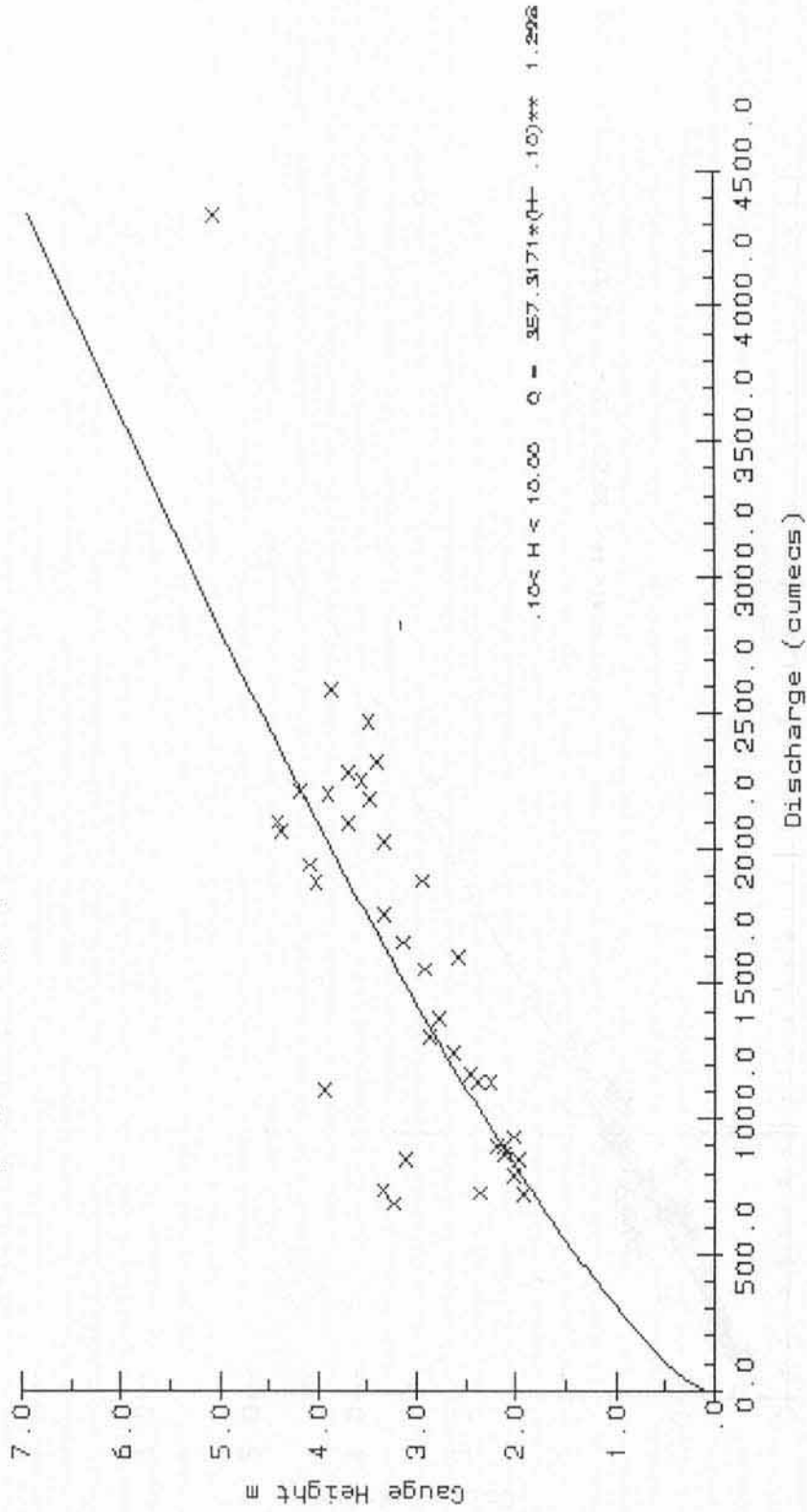
Appendix A4.2: Graphs of Rating Curves for all the flow gauging Stations used in this Study



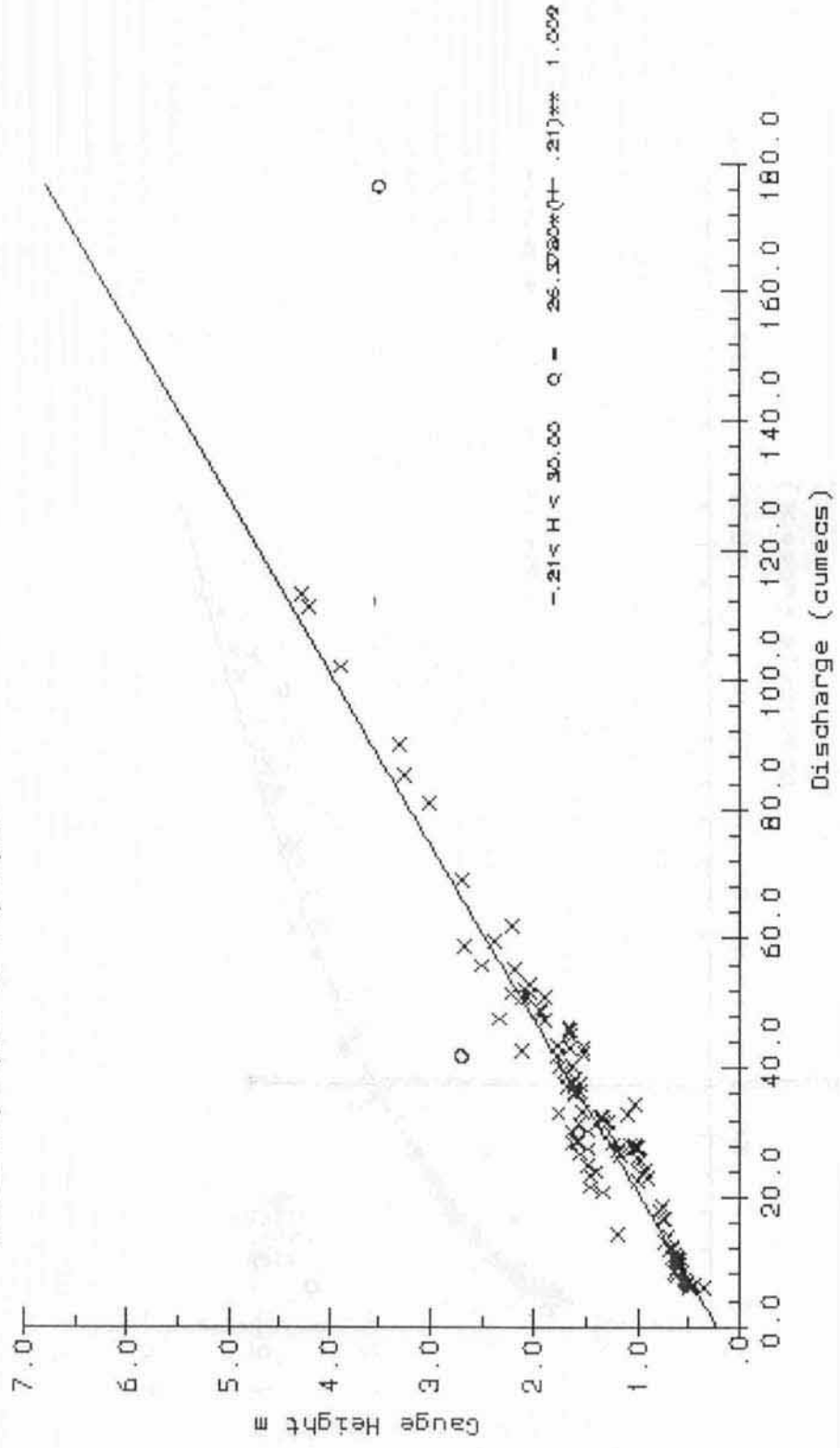
RIVER NAME:.....RUHUDJI AT MKASU (MHAYAMLUNGU),.....
STATION CODE:.....1KB10,.....
Valid 02/02/60 to 08/05/76



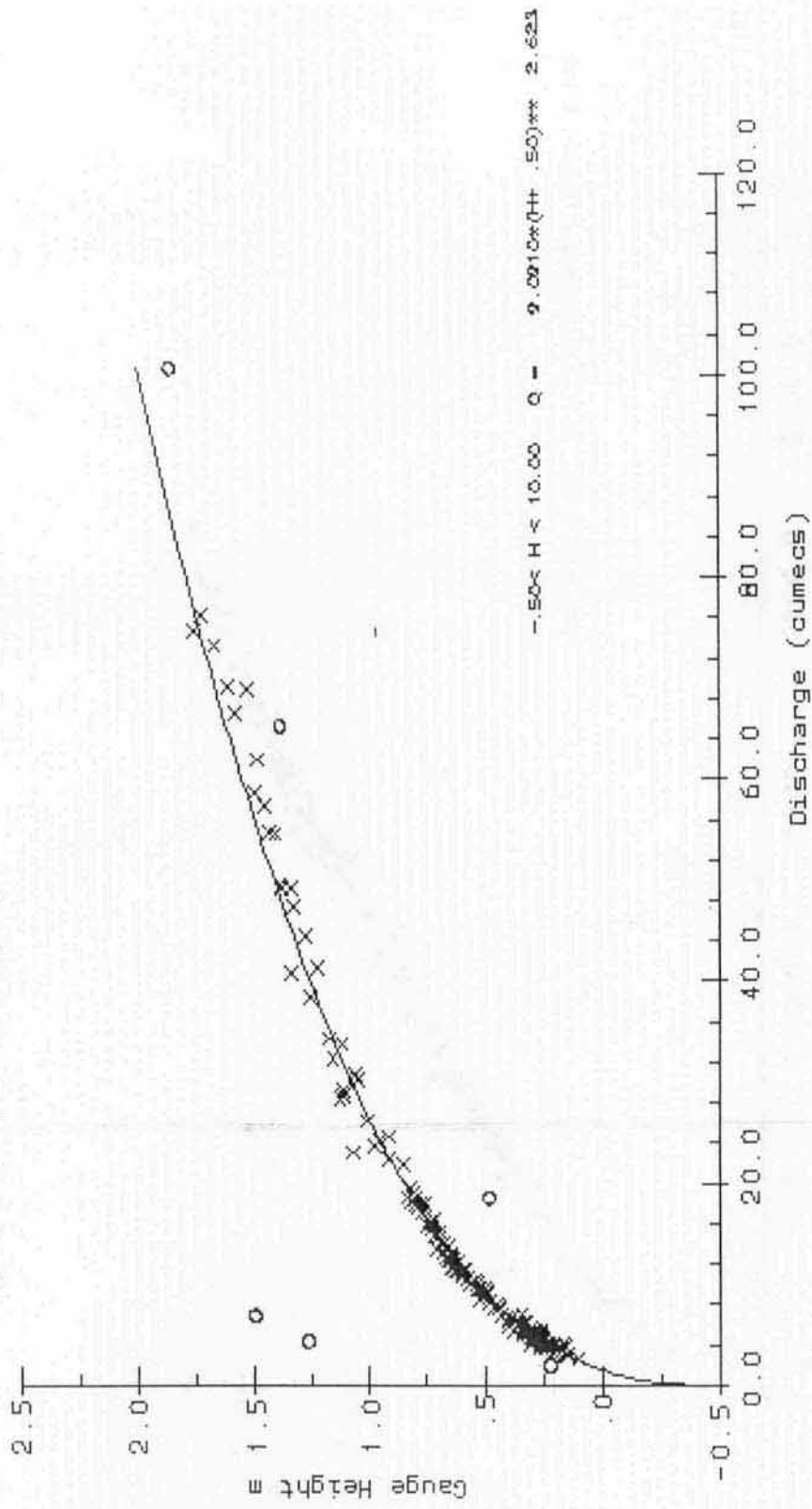
RIVER NAME: RUFUJI AT MLOKA.....
 STATION CODE 1K4(1-DAY LAG FOR STIEGLER'S FLOWS)
 Valid 23/02/78 to 26/05/79

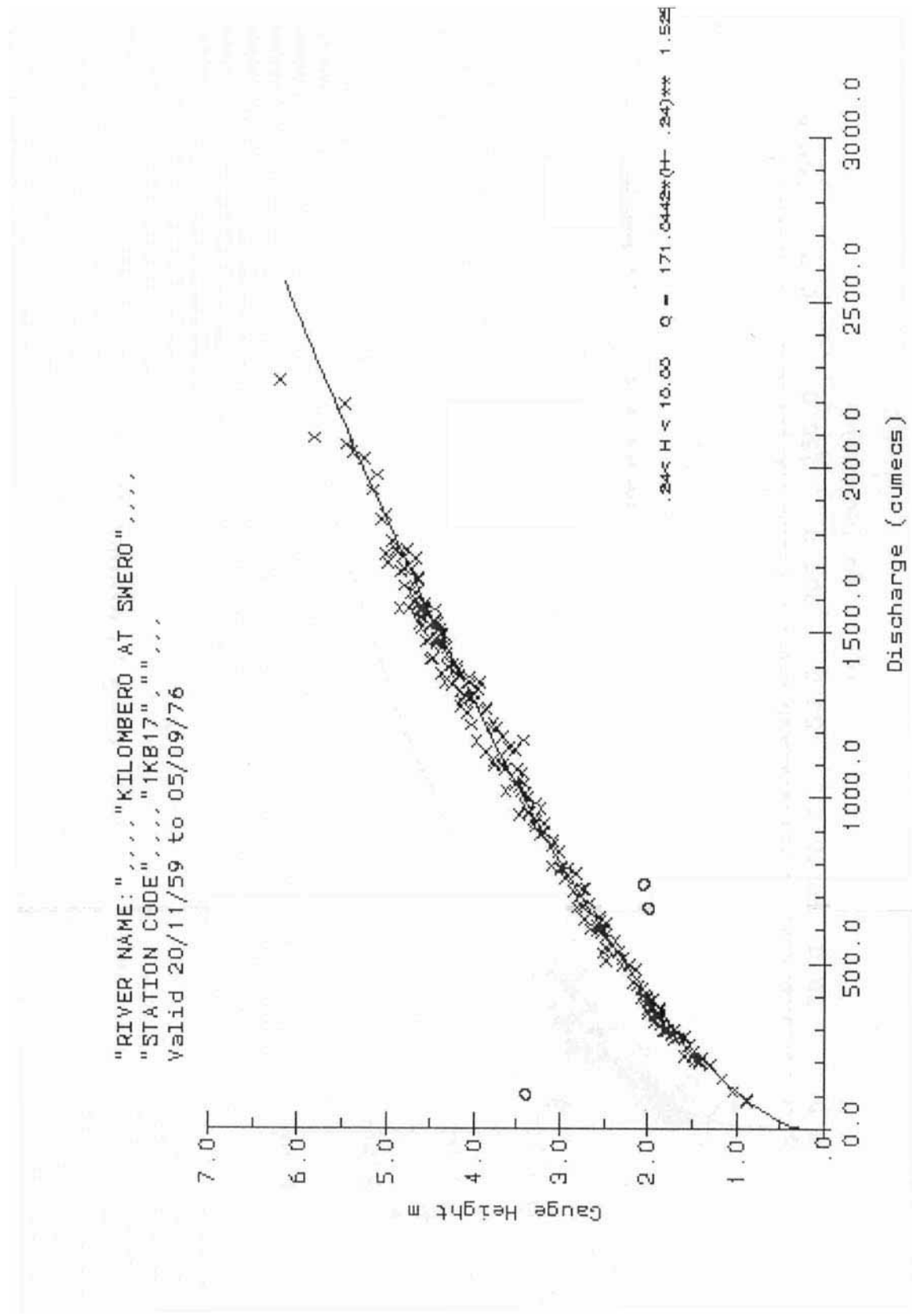


RIVER NAME: MNGETA AT MNGETA MISSION D/S,,,,,,,,,
STATION CODE: 1KB15A,,,,,,,,,
Valid 09/02/60 to 11/10/83

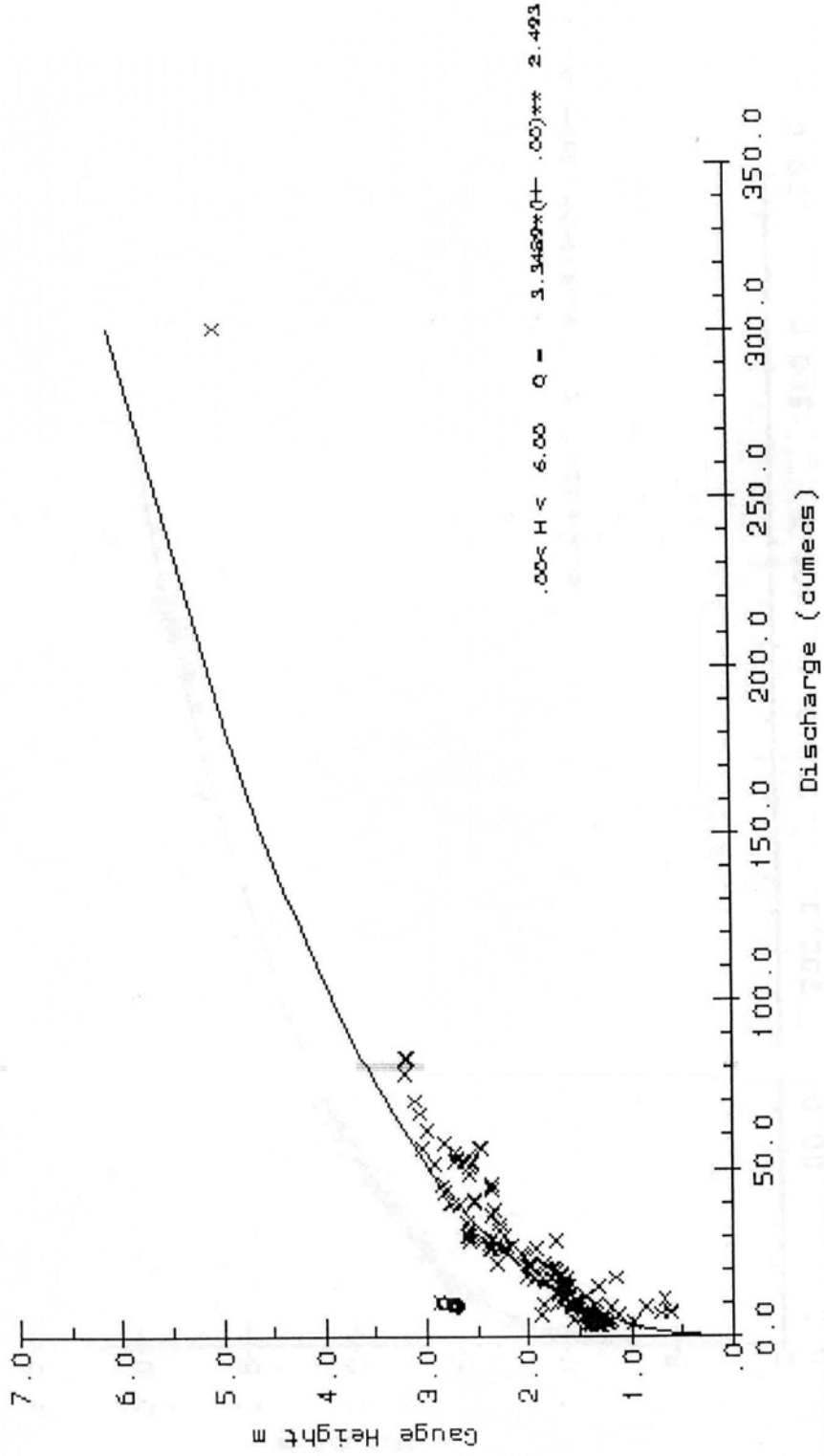


RIVER NAME:,,, LUMEMO KIBURUBUTU,,,,
STATION CODE:,,, 1KB14A,,,,
Valid 17/01/66 to 19/09/90

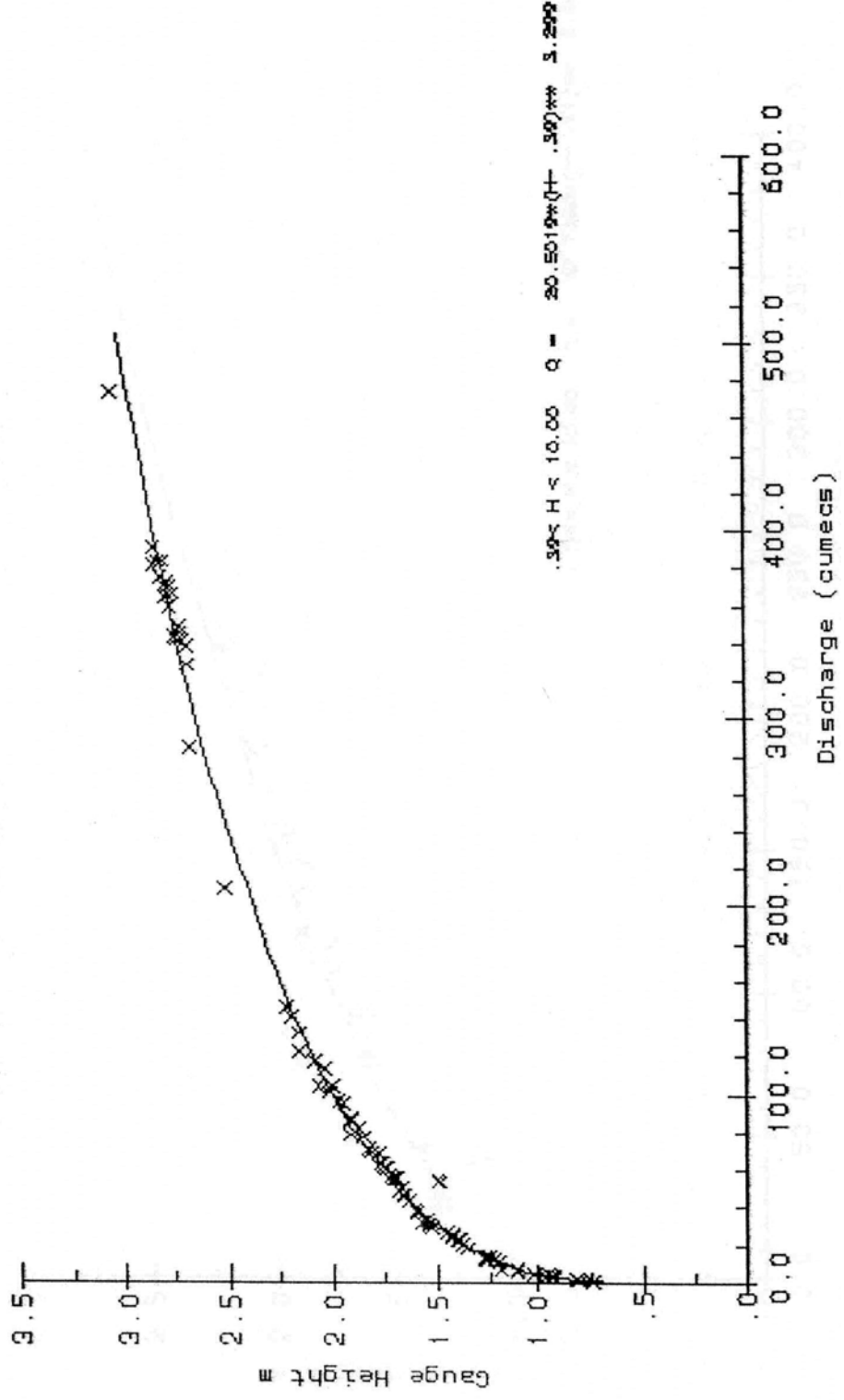




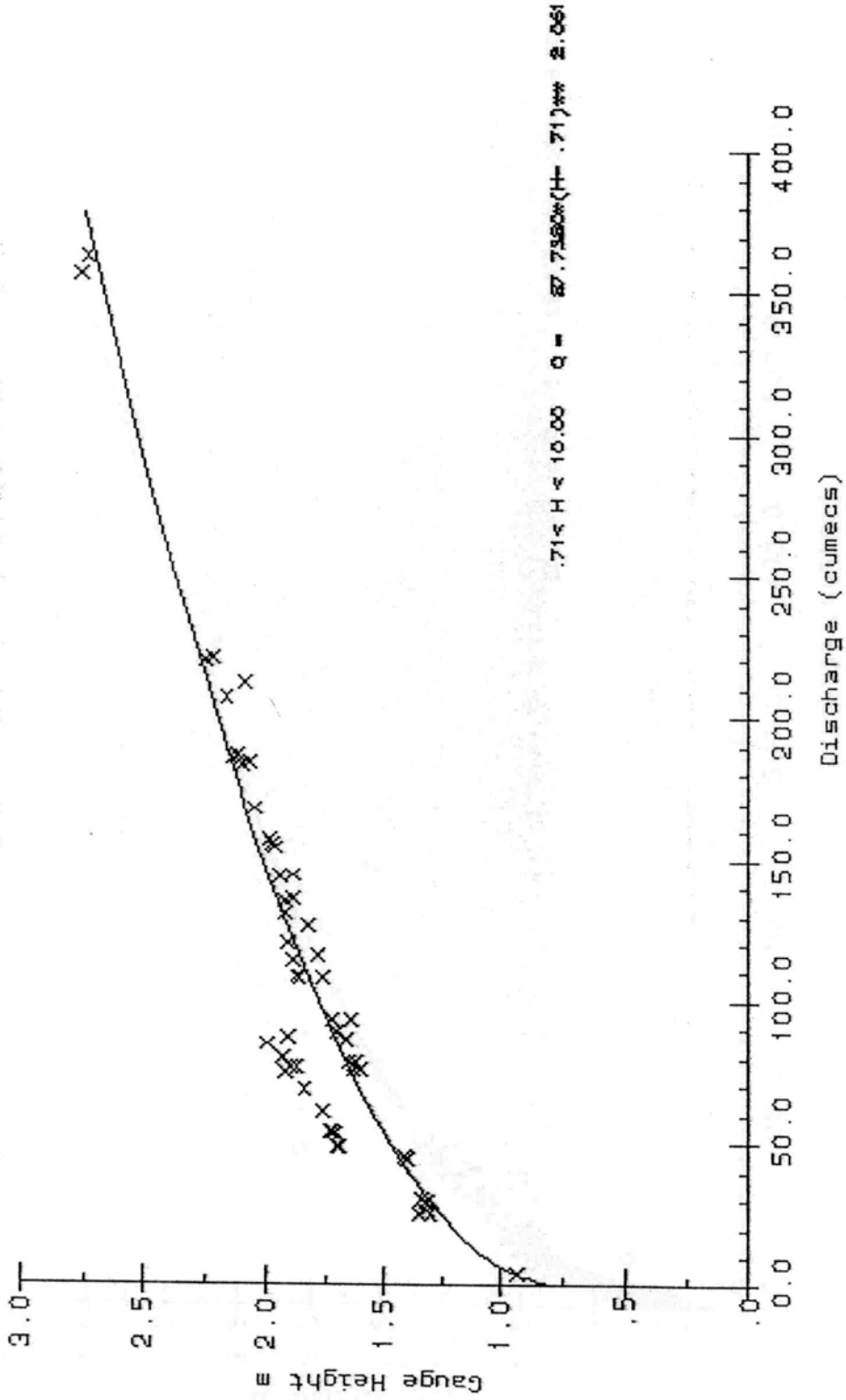
RIVER NAME:.....LITTLE RUAHA AT MAWANDE.....
STATION CODE:.....1KA31.....
Valid 20/08/64 to 23/10/95

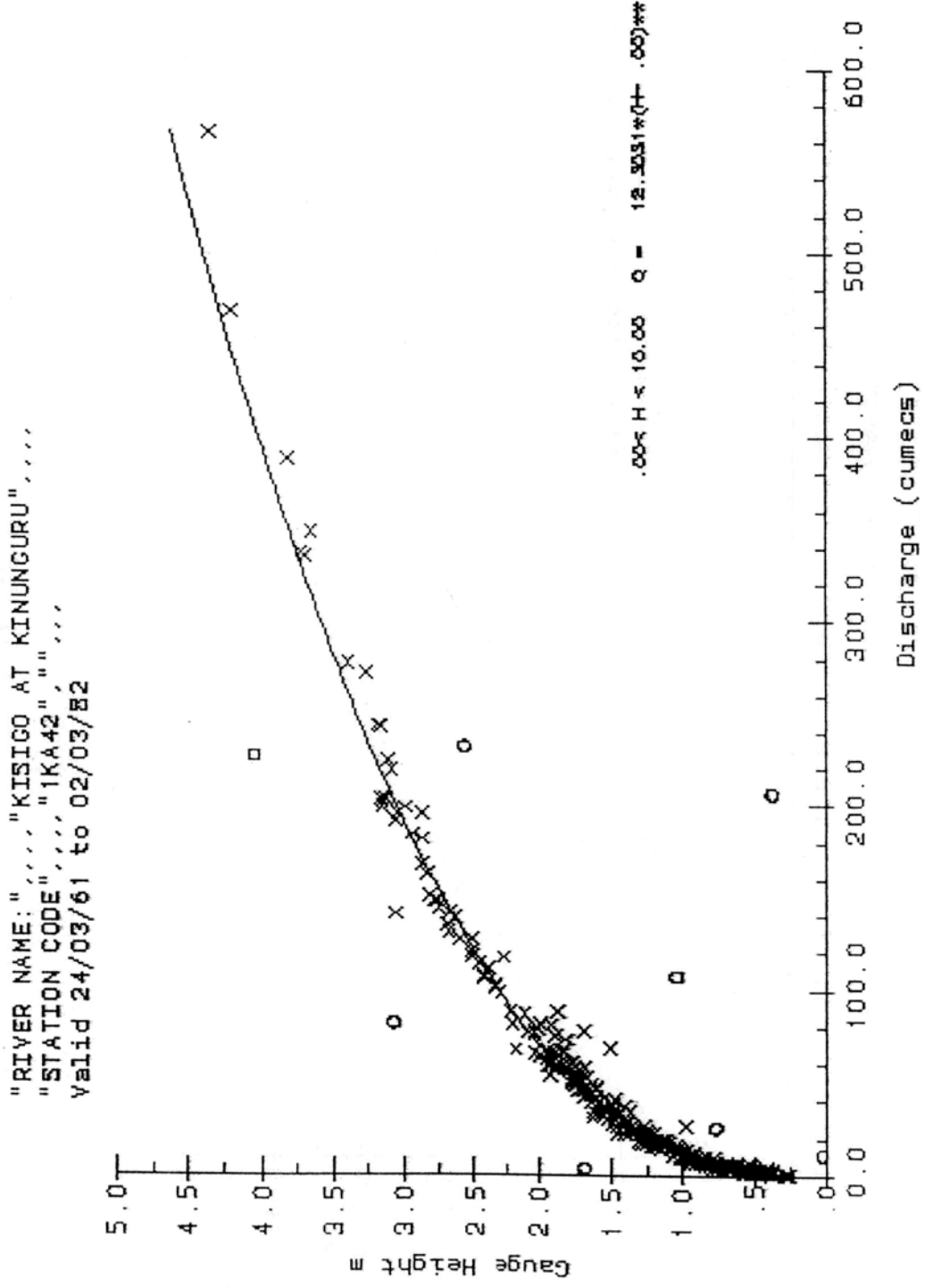


"RIVER NAME: " , , , , "GREAT RUAHA AT MSEMBE" , , , , ,
 "STATION CODE" , , , , "1KA59" , , , , ,
 Valid 13/12/63 to 08/05/79

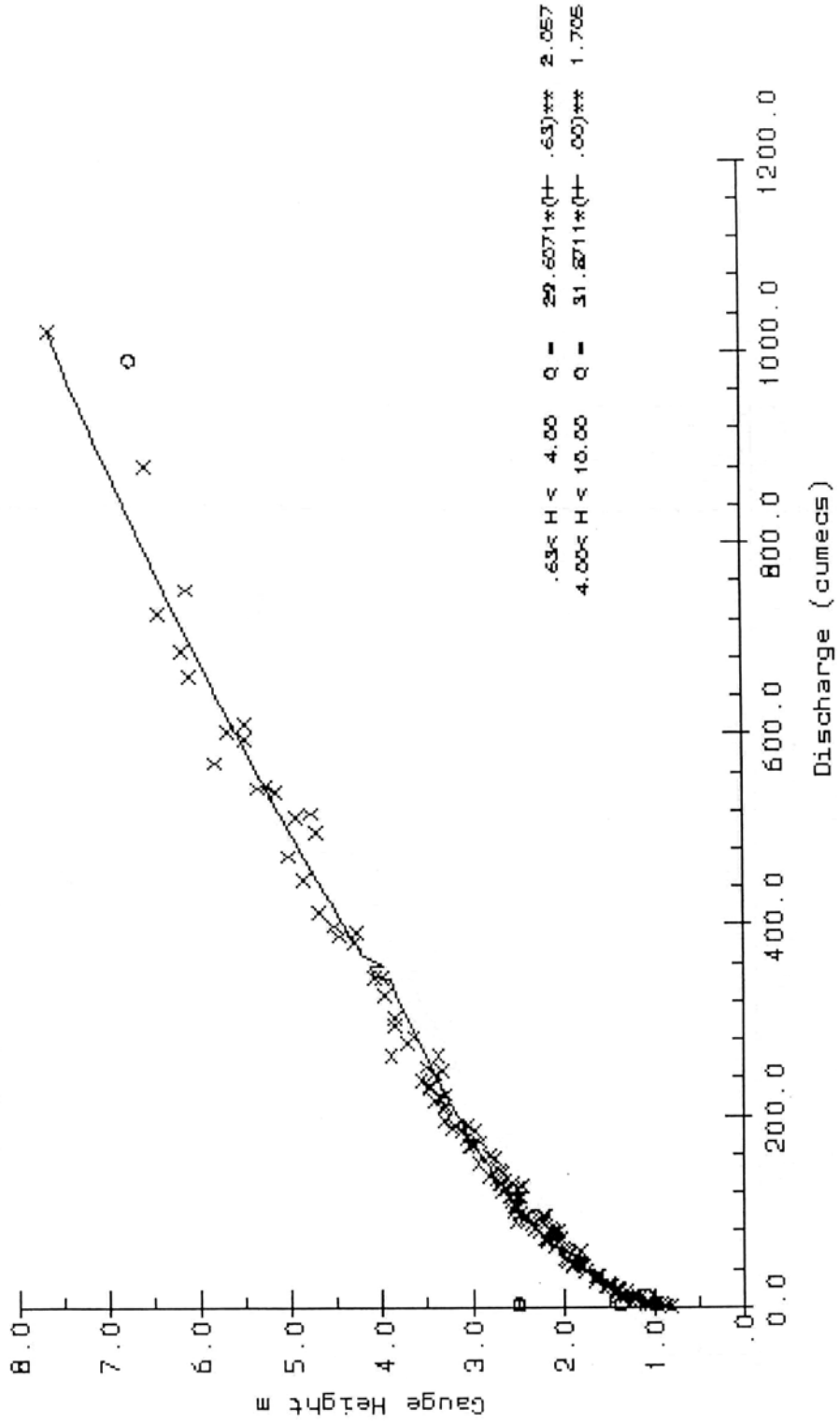


"RIVER NAME: ", "GREAT RUAHA AT MSEMBE",
 "STATION CODE", "1KA59",
 Valid 09/05/79 to 20/05/85

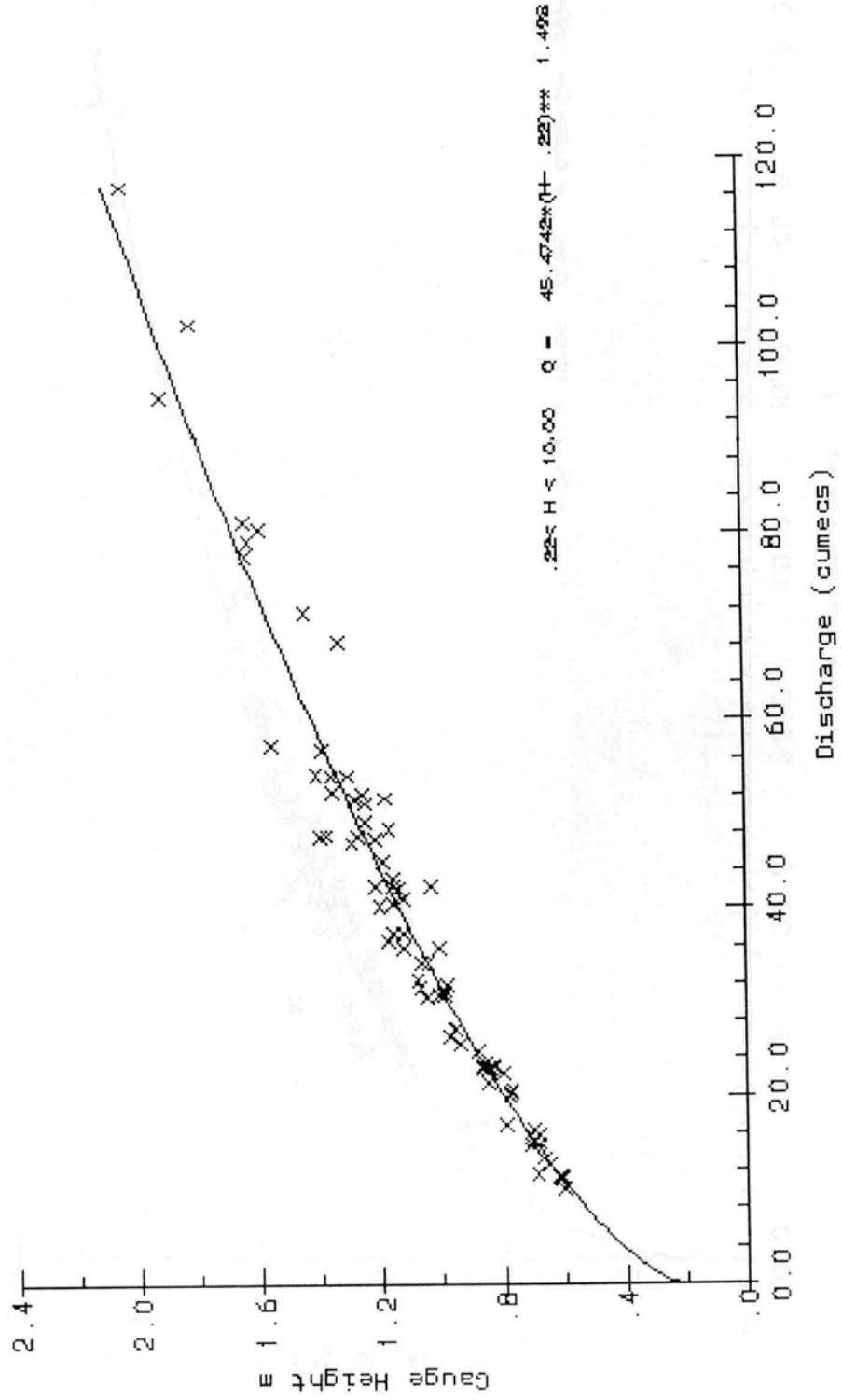




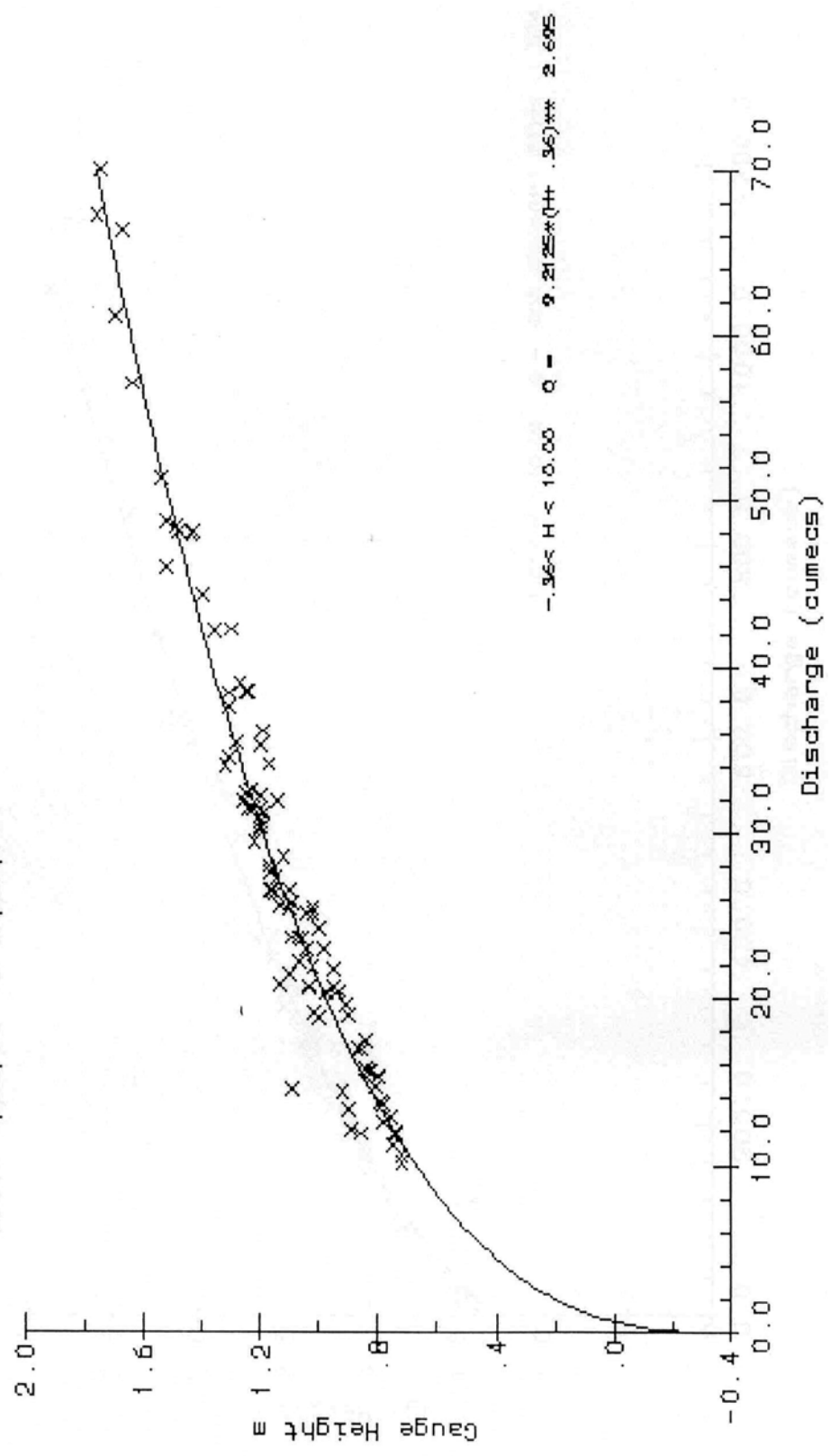
RIVER NAME: GREAT RUAHA AT MTERA
 STATION CODE: 1KAS
 Valid 03/02/60 to 13/05/80



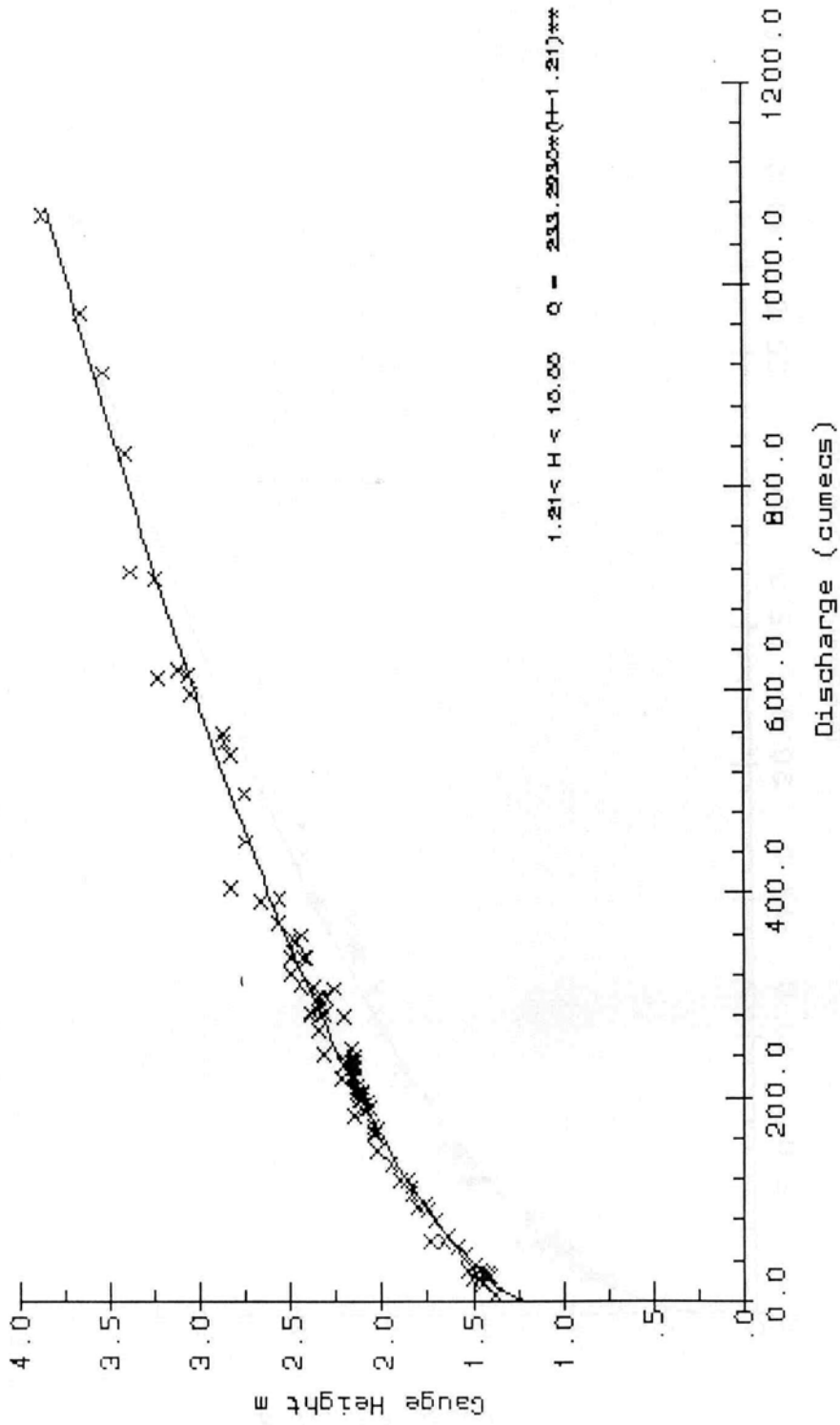
"RIVER NAME: " , , , , "LUKOSI RIVER AT MTANDIKA D/S" , , , , ,
 "STATION CODE" , , , , "1KA37A" , , , , ,
 Valid 18/11/64 to 29/08/71



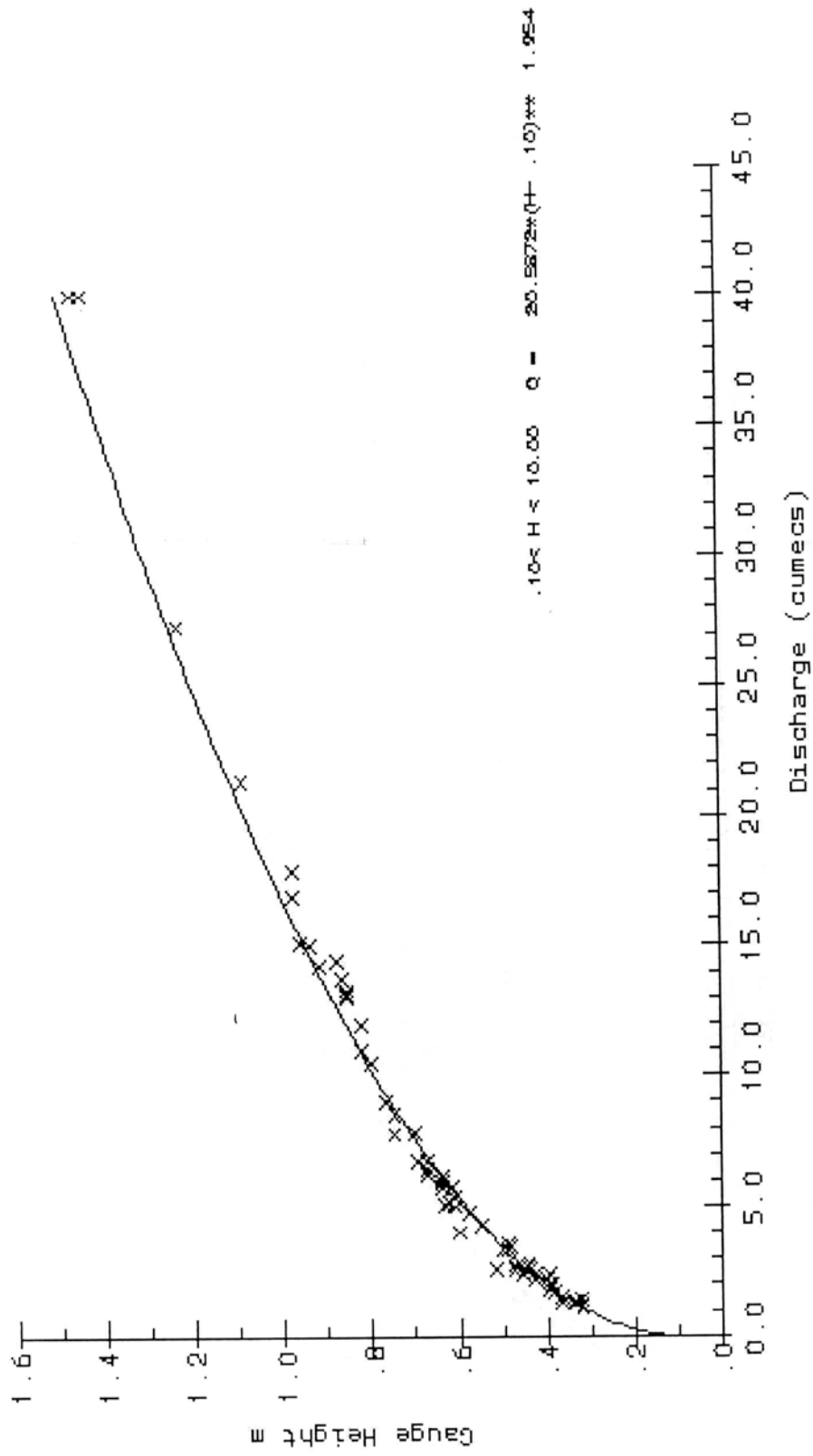
"RIVER NAME: " , , , , "LUKOSI RIVER AT MTANDIKA D/S" , , , , ,
 "STATION CODE" , , , , "IKA37A" , " " , , , , ,
 Valid 21/04/71 to 27/03/87



RIVER NAME: GREAT RUAHA AT GORGE
 STATION CODE: 1KA61
 Valid 20/04/67 to 08/03/73

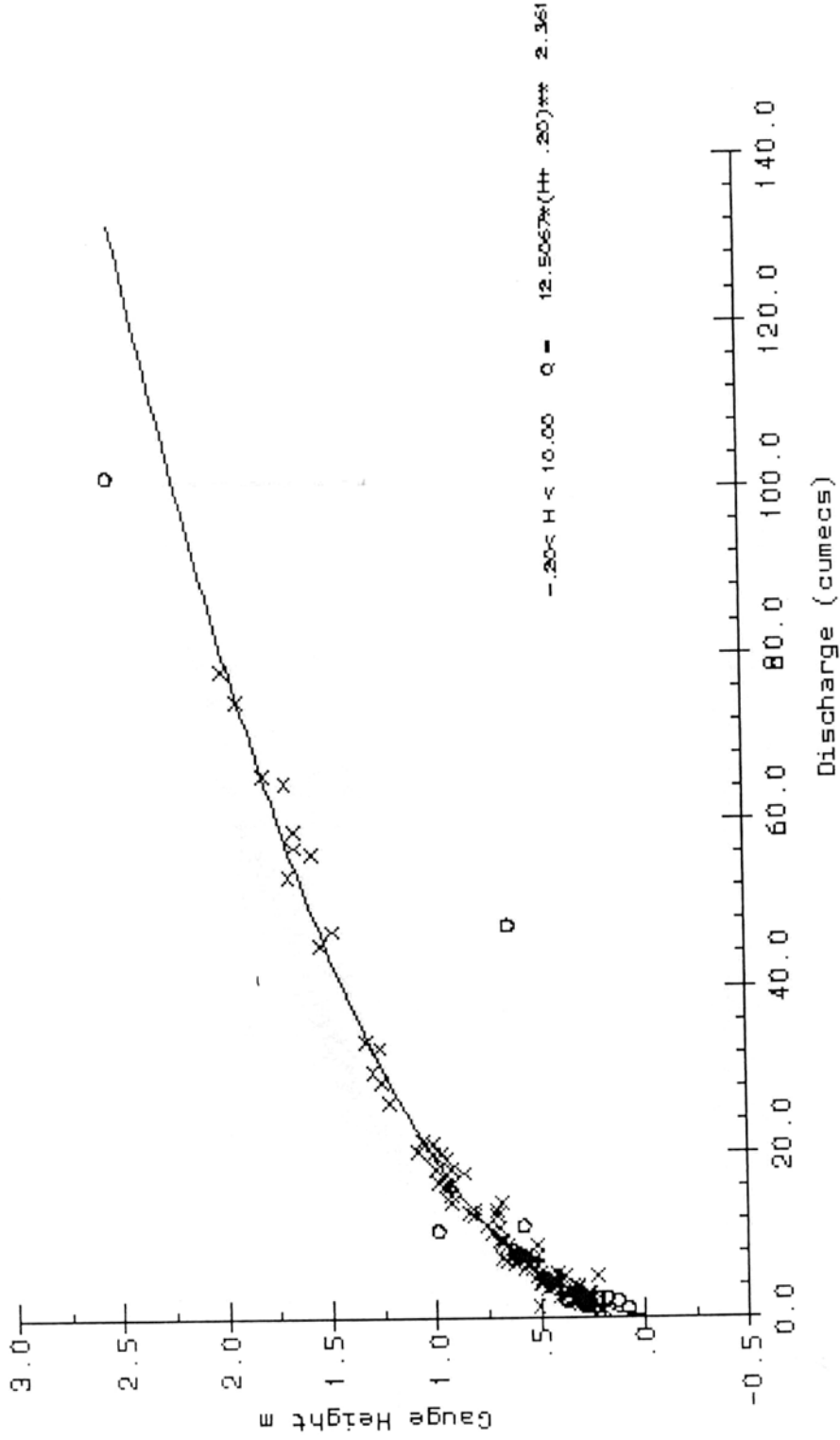


RIVER NAME: YОВI RIVER AT GREAT RUАHA CONFLUENCE
 STATION CODE: 1KA3B, START AFTER 1ST MEAS. NO. 20
 Valid 14/08/59 to 07/01/68

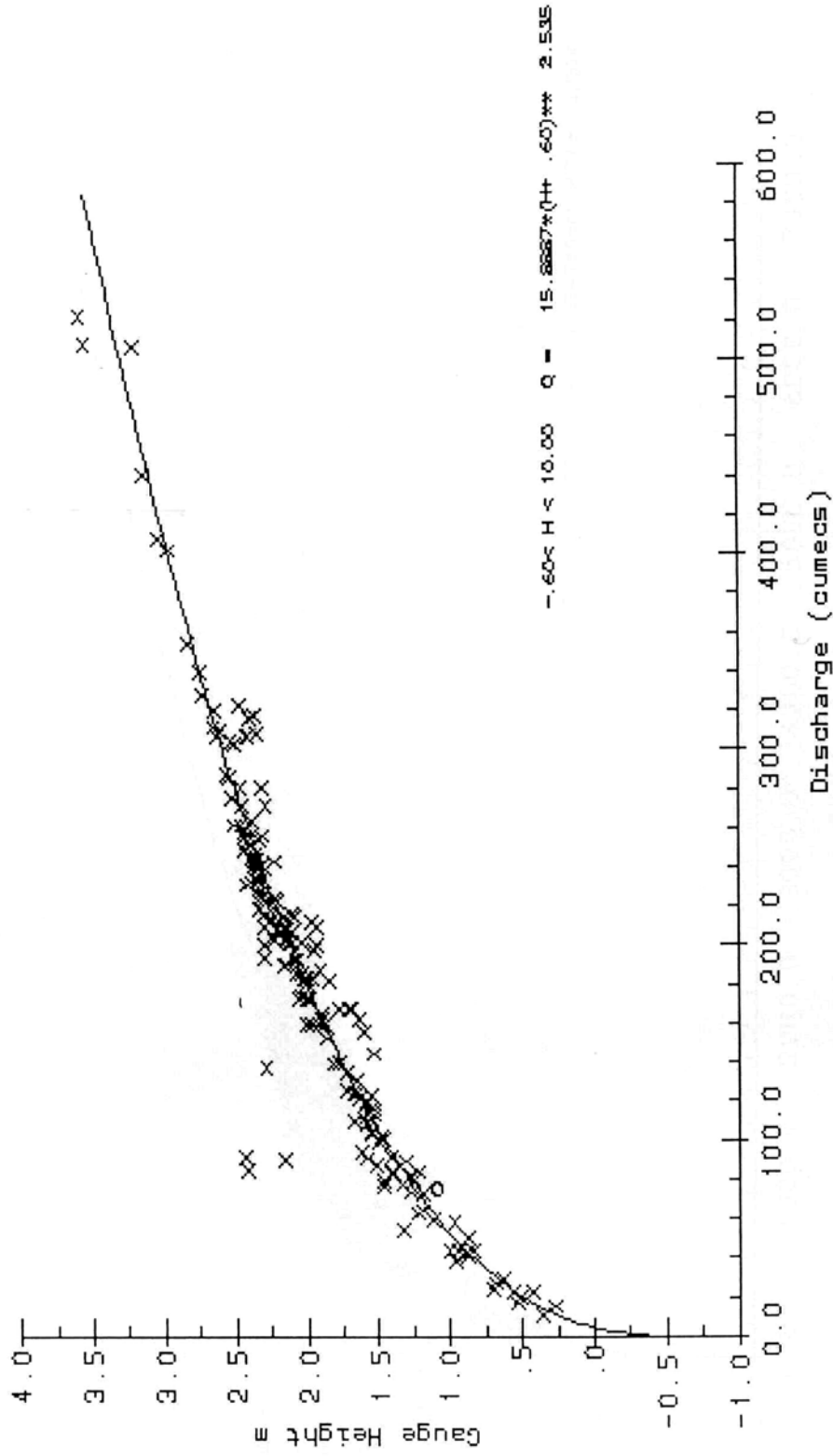


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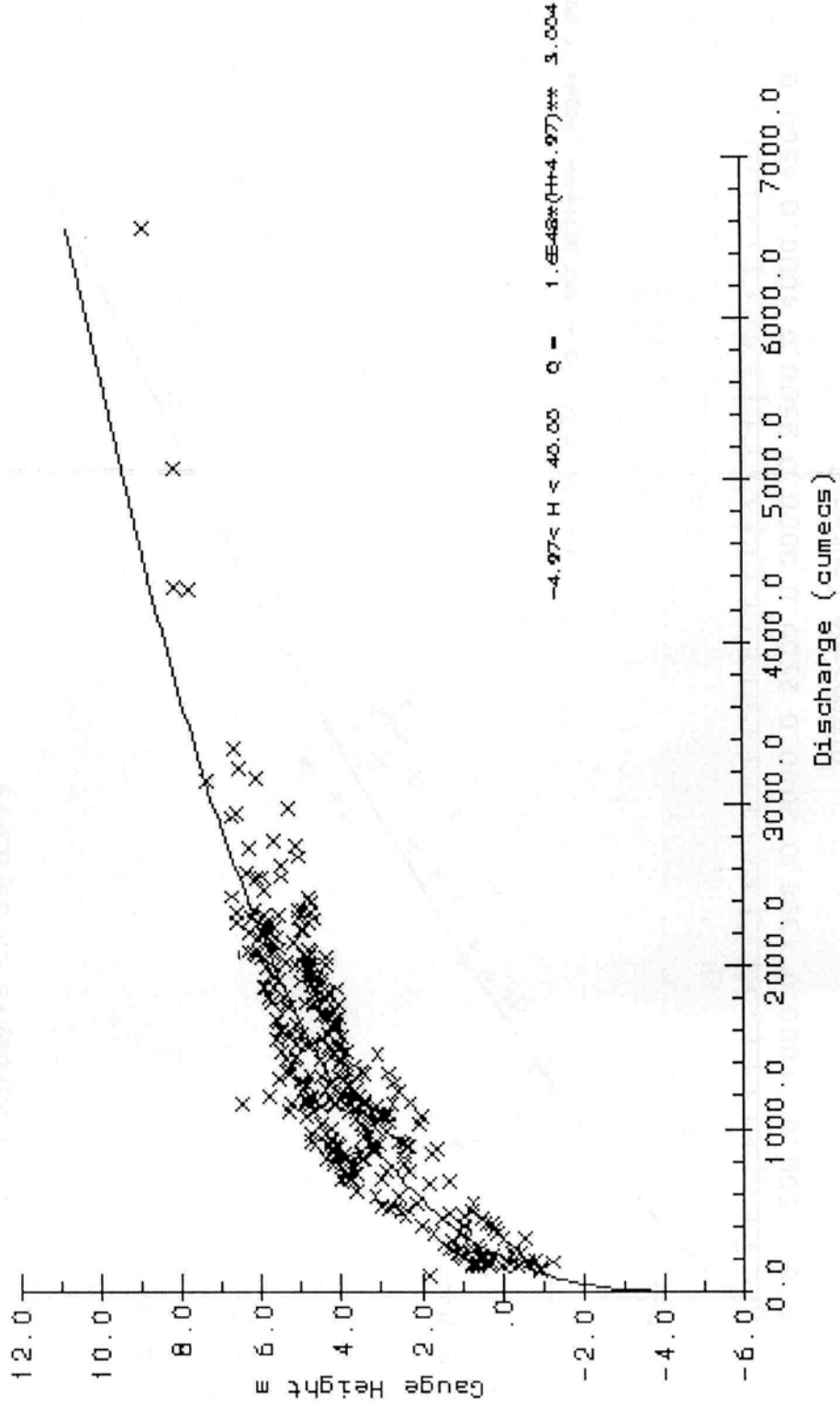
RIVER NAME: YOWI RIVER AT GREAT RUAHA CONFLUENCE,
 STATION CODE: 1KA38, START AFTER 1ST MEAS. NO. 20,
 valid 07/01/68 to 17/11/84



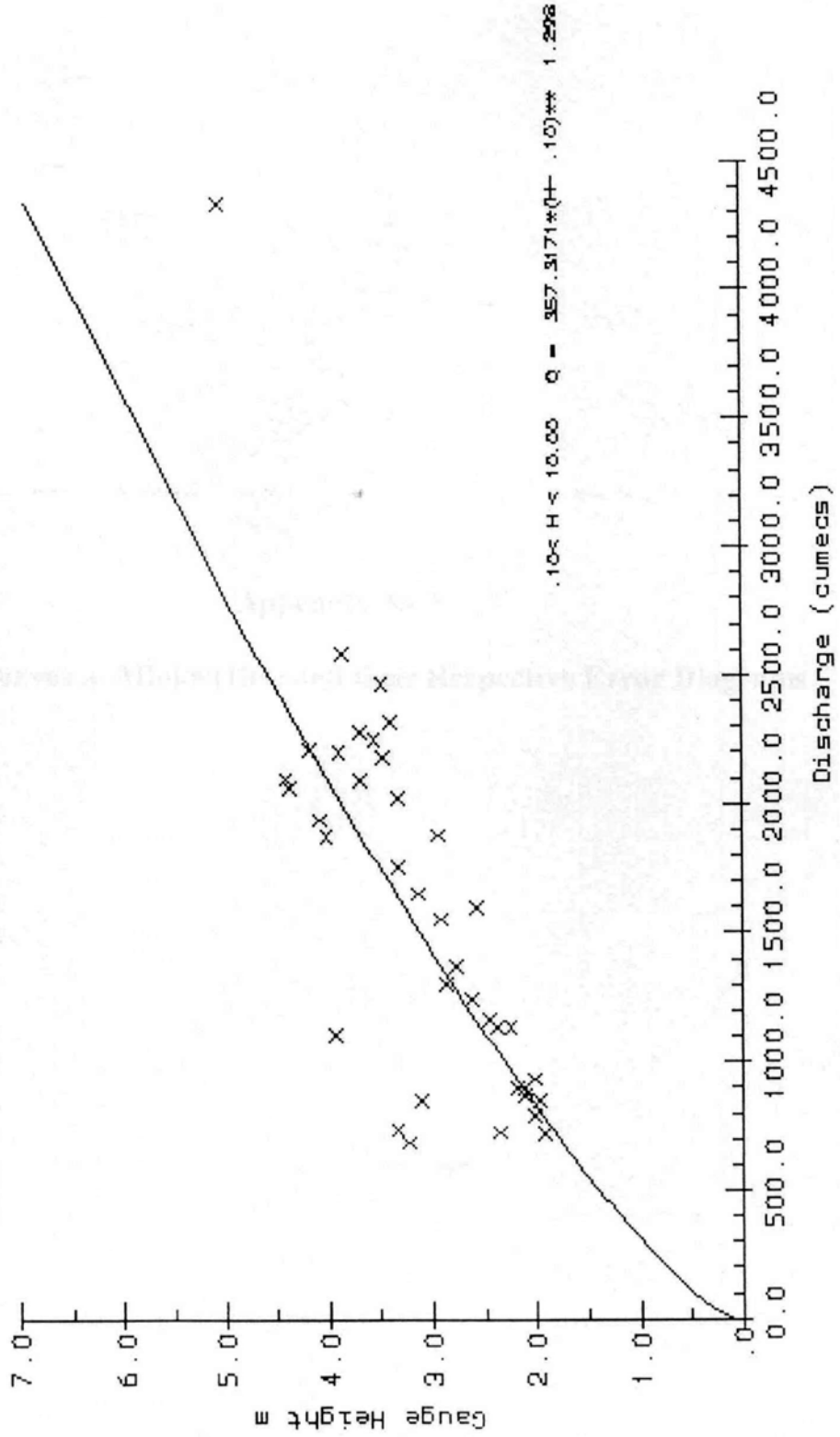
"RIVER NAME: " "GREAT RUAHA AT KIDATU" , , , , ,
 "STATION CODE" , , , , "1KA3" , " " , , , , ,
 Valid 04/09/59 to 14/10/69



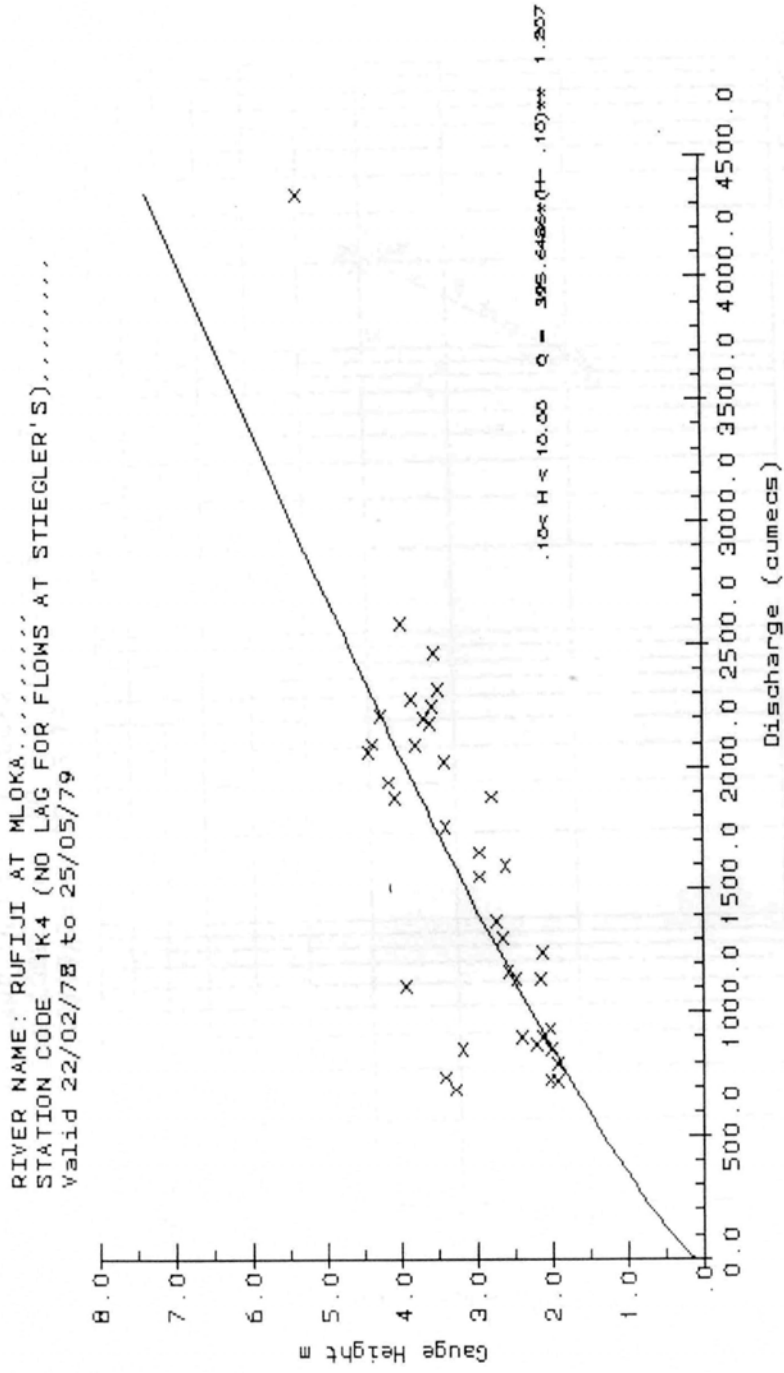
RIVER NAME: RUFUJI AT STIEGLERS GORGE.....
STATION CODE: 1K3.....
Valid 05/09/59 to 18/06/83



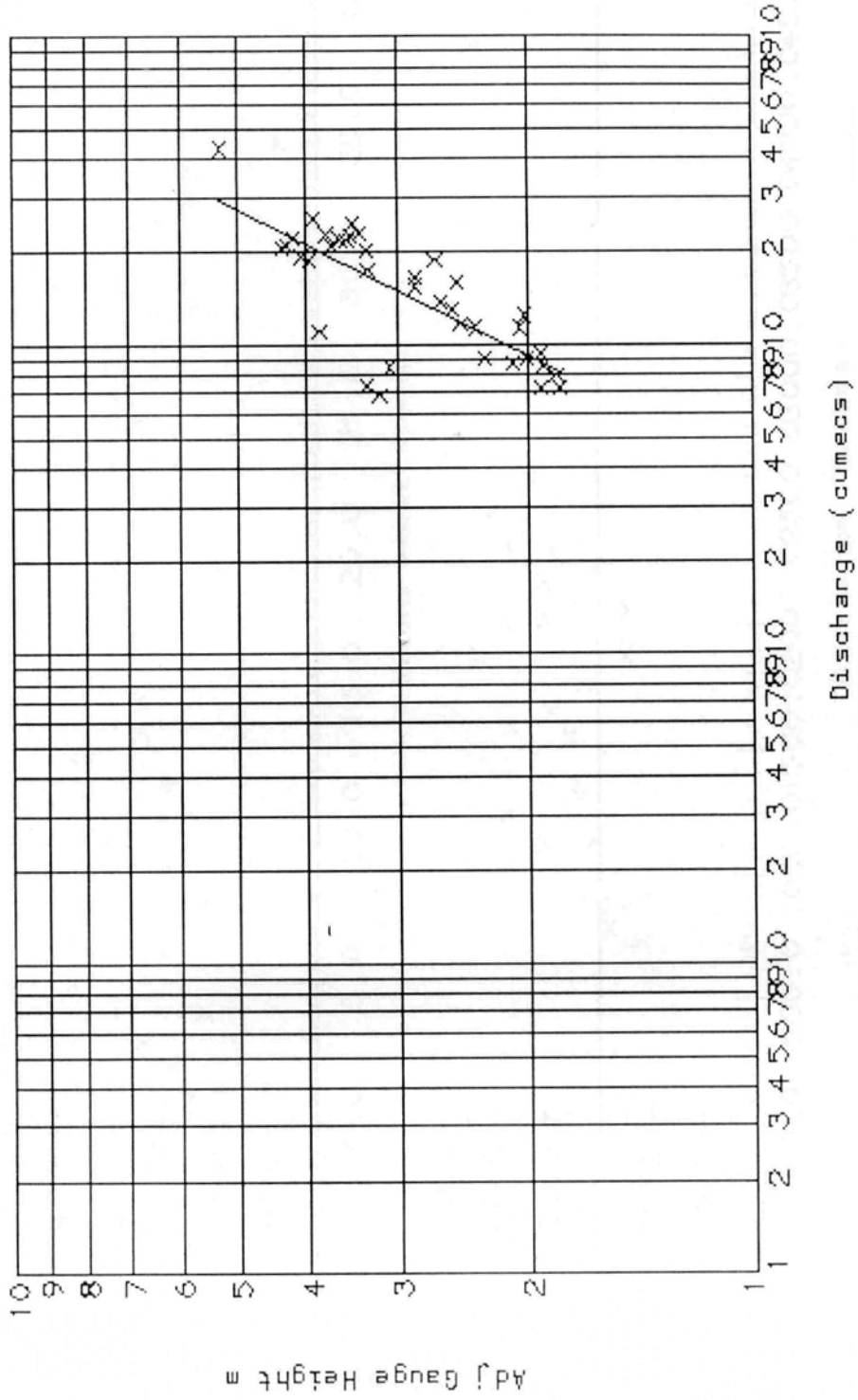
RIVER NAME: RUFUJI AT MLOKA.....
 STATION CODE 1K4(1-DAY LAG FOR STIEGLER'S FLOWS)
 Valid 23/02/78 to 26/05/79

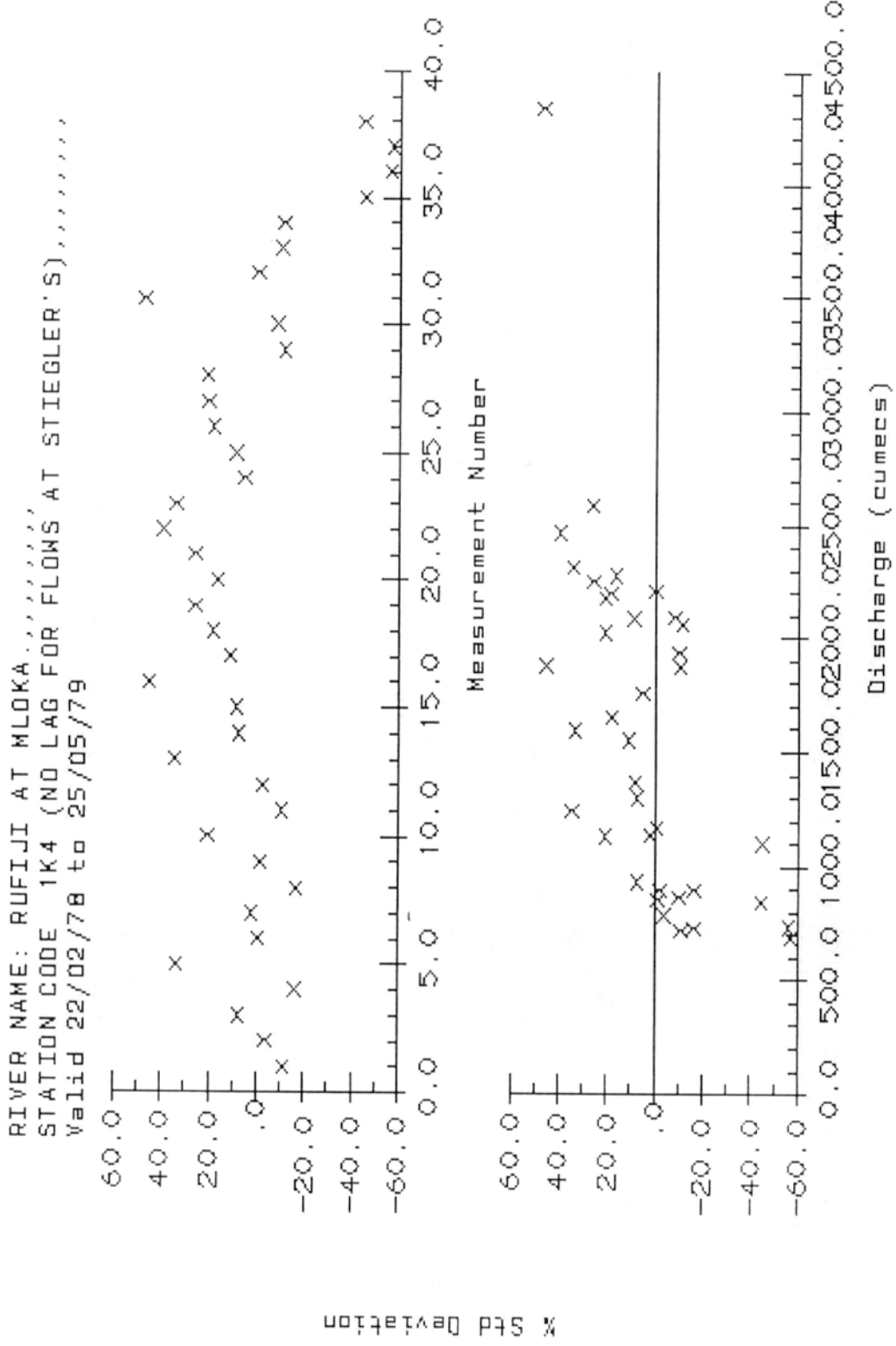


Appendix A4.3: Rating Curves at Mloka (1k4) and their Respective Error Diagrams

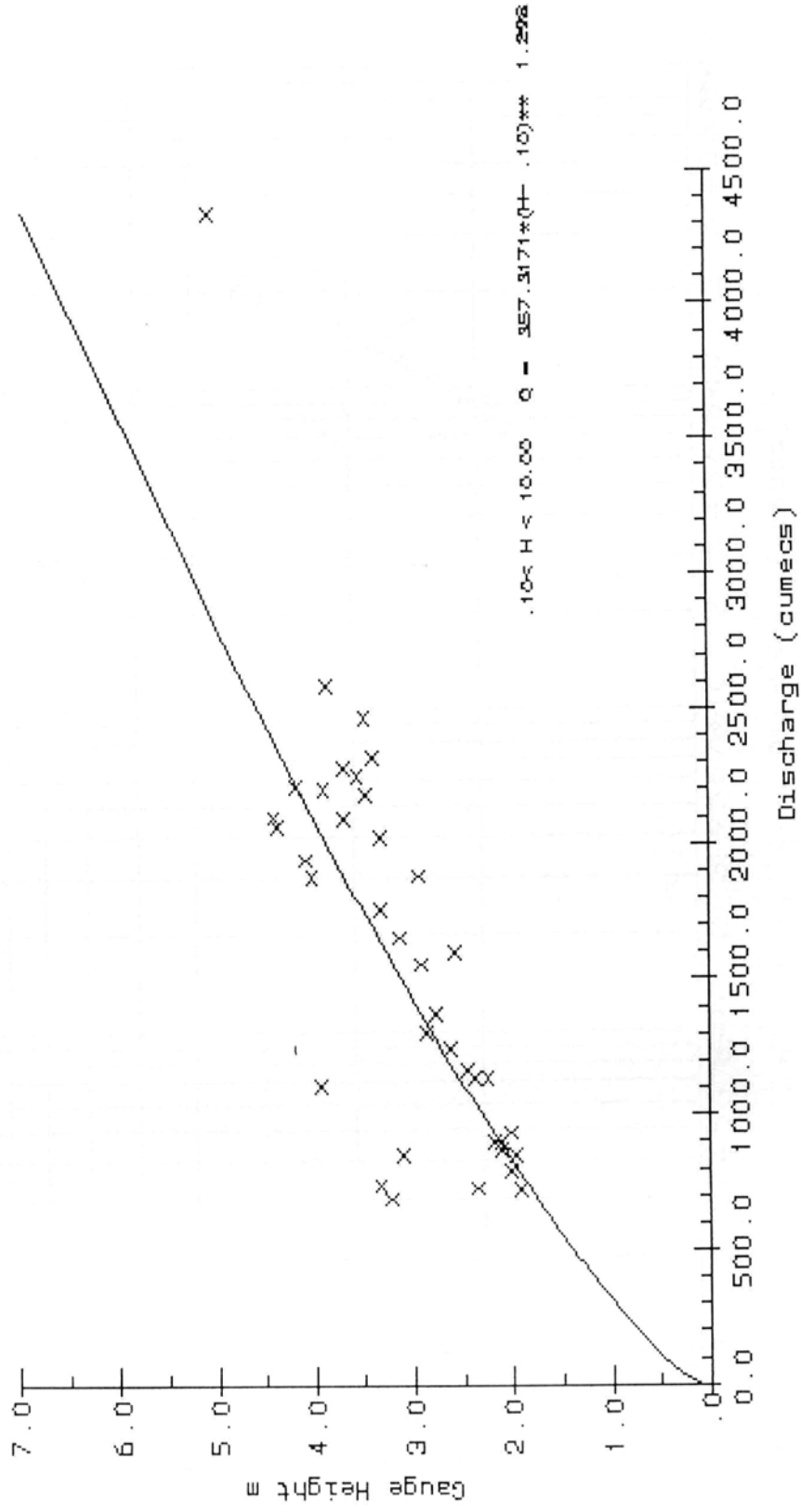


RIVER NAME: RUFUJI AT MLOKA.....
 STATION CODE 1K4 (NO LAG FOR FLOWS AT STIEGLER'S).....
 Valid 22/02/78 to 25/05/79

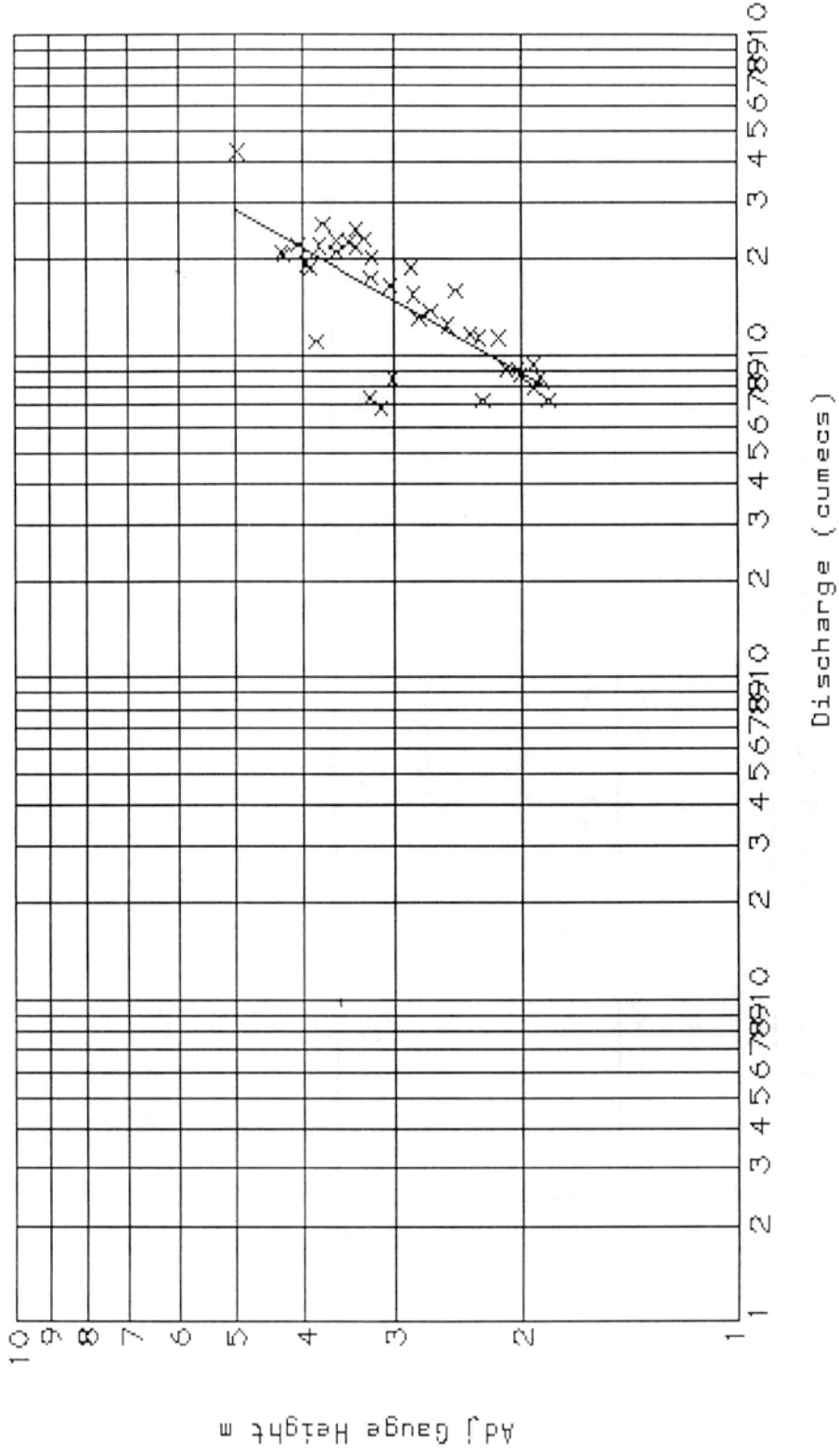


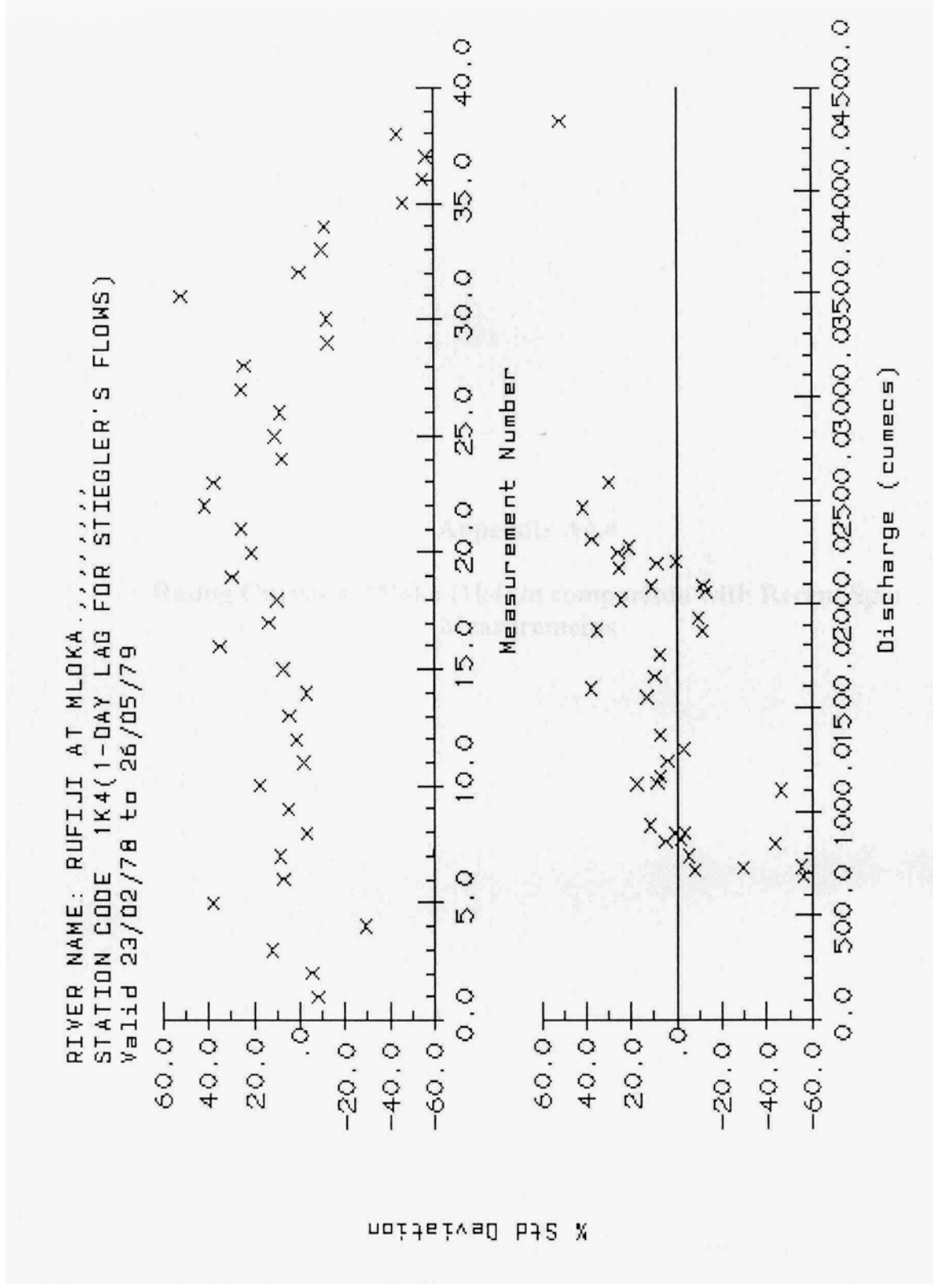


RIVER NAME: RUFUJI AT MLOKA.....
 STATION CODE 1K4(1-DAY LAG FOR STIEGLER'S FLOWS)
 Valid 23/02/78 to 26/05/79

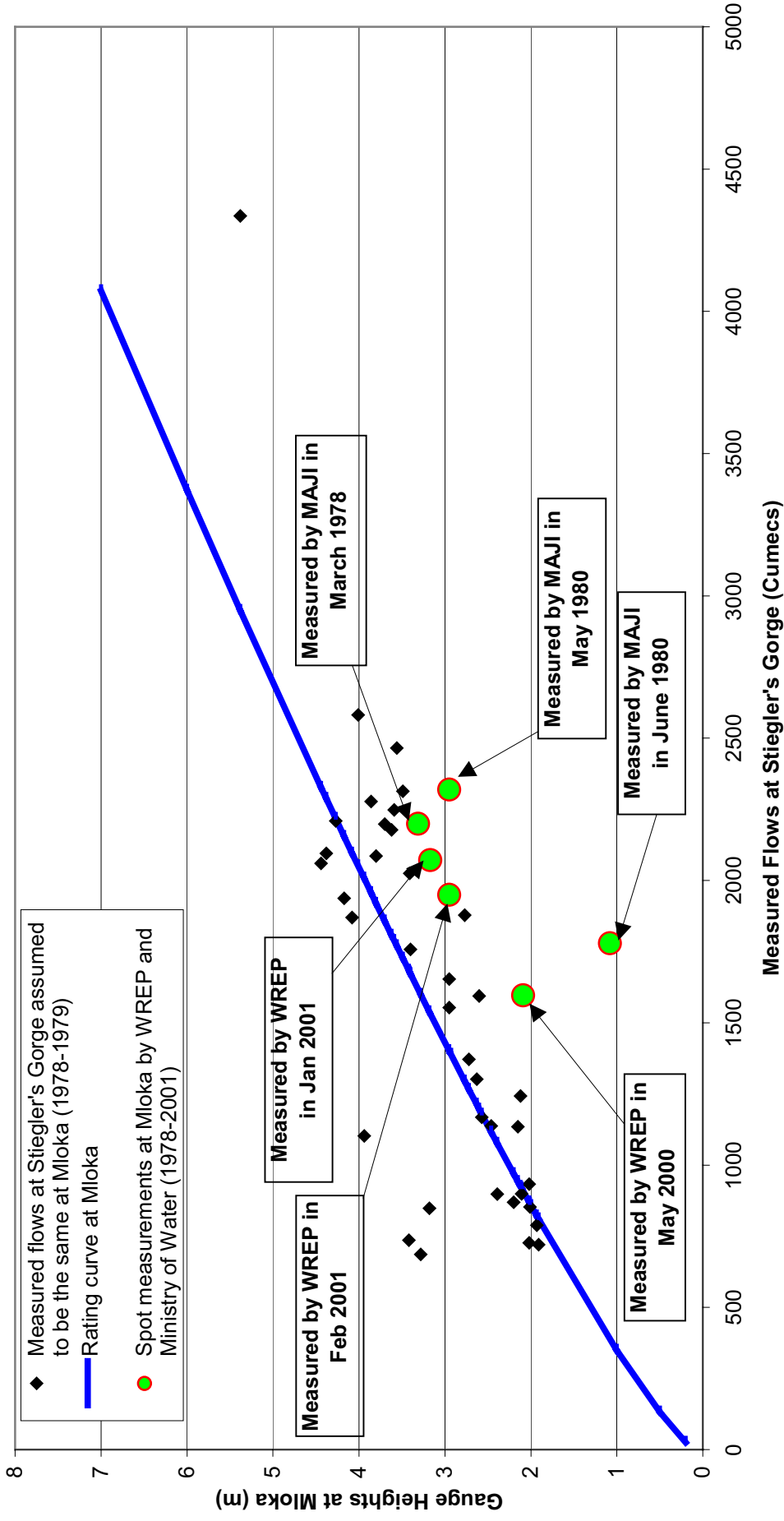


RIVER NAME: RUFUJI AT MLOKA.....
 STATION CODE 1K4(1-DAY LAG FOR STIEGLER'S FLOWS)
 Valid 23/02/78 to 26/05/79

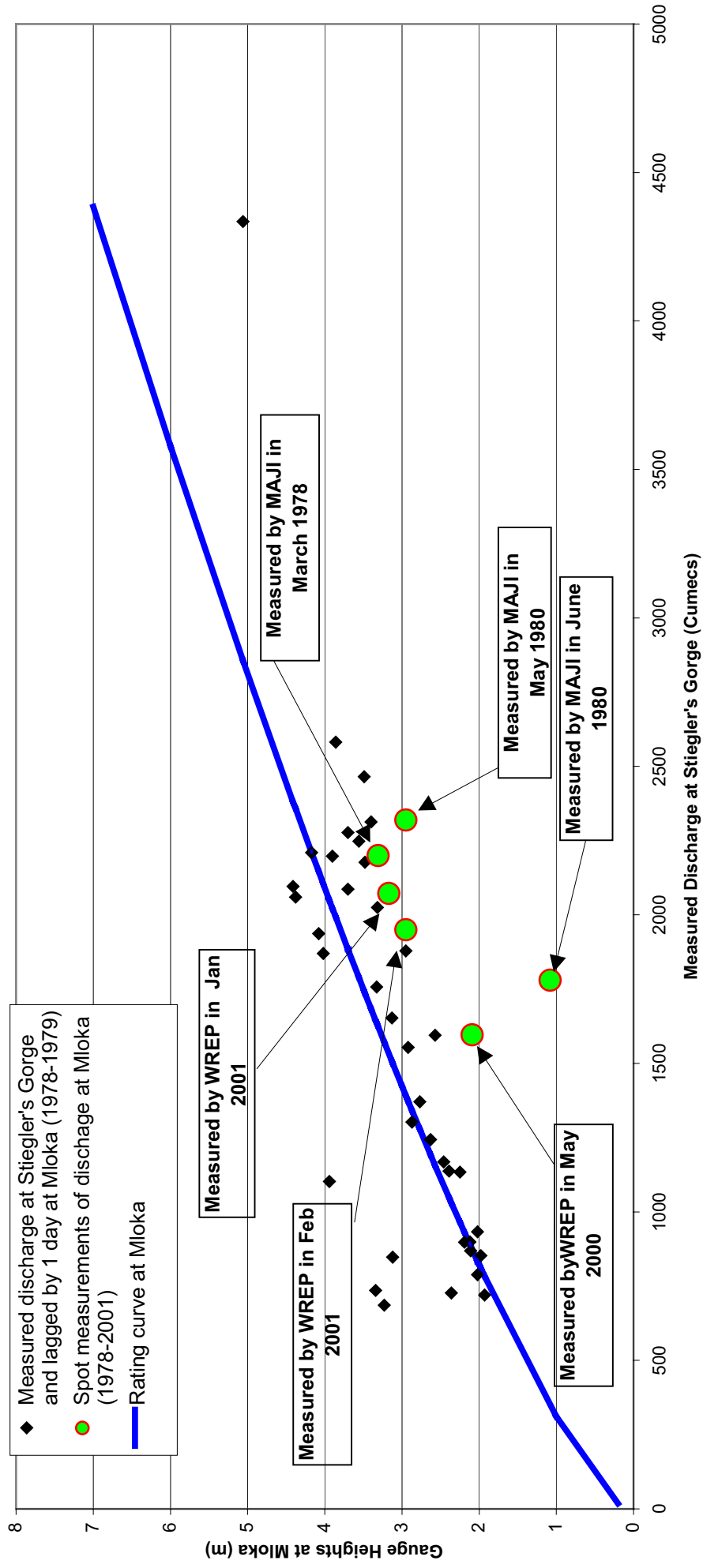




Appendix A4.4: Rating Curves at Mloka (1k4) in comparison with Recent Spot Measurements



Rating curve at Mloka (1k4) with no lag for flows at Stiegler's Gorge



Rating curve at Mloka (1k4) with flows at Stiegler's Gorge lagged by 1-day

Appendix A6.1: List of 2 m Interval Contours Maps of Rufiji Floodplain from RUBADA

No.	Lower Rufiji Floodplain 2m Interval Map from RUBADA	2m Contour Map Digitized?	Digitized River Present for this Map?	No.	Lower Rufiji Floodplain 2m Interval Map from RUBADA	2m Contour Map Digitized?	Digitized River Present for this Map?
1	B061	No	No	54	E122	Yes	Yes
2	B062	No	No	55	E123	Yes	Yes
3	B064	No	No	56	E124	Yes	Yes
4	B071	No	No	57	E131	Yes	Yes
5	B072	Yes	Yes	58	E132	Yes	Yes
6	B073	No	No	59	E133	Yes	Yes
7	B074	Yes	Yes	60	E134	Yes	Yes
8	B081	Yes	Yes	61	E143	No	Yes
9	B082	Yes	Yes	62	E144	No	Yes
10	B083	Yes	Yes	63	E153	No	Yes
11	B084	Yes	Yes	64	E154	No	Yes
12	B093	Yes	Yes	65	E163	No	No
13	B094	No	No	66	E164	Yes	Yes
14	C071	Yes	Yes	67	E173	Yes	Yes
15	C072	Yes	Yes	68	E174	Yes	Yes
16	C073	Yes	Yes	69	E183	Yes	Yes
17	C074	Yes	Yes	70	F112	Yes	Yes
18	C081	Yes	Yes	71	F121	Yes	Yes
19	C082	Yes	Yes	72	F122	Yes	Yes
20	C083	Yes	Yes	73	F131	Yes	Yes
21	C084	Yes	Yes	74	F132	Yes	Yes
22	C091	Yes	Yes	75	F141	Yes	Yes
23	C092	Yes	No	76	F142	Yes	Yes
24	C093	Yes	Yes	77	F143	Yes	Yes
25	C094	Yes	Yes	78	F144	Yes	Yes
26	D061	Yes	Yes	79	F151	Yes	Yes
27	D062	Yes	Yes	80	F152	Yes	Yes
28	D071	Yes	Yes	81	F153	Yes	Yes
29	D072	Yes	Yes	82	F154	Yes	Yes
30	D073	Yes	Yes	83	F161	Yes	No
31	D081	Yes	Yes	84	F162	Yes	Yes
32	D082	Yes	Yes	85	F163	Yes	Yes
33	D084	Yes	Yes	86	F164	No	No
34	D091	Yes	Yes	87	F171	Yes	Yes
35	D092	Yes	Yes	88	F172	Yes	Yes
36	D093	Yes	Yes	89	F173	Yes	Yes
37	D094	Yes	Yes	90	F174	Yes	Yes
38	D101	Yes	Yes	91	F181	Yes	Yes
39	D103	Yes	Yes	92	F183	Yes	Yes
40	D104	Yes	Yes	93	G161	No	Yes
41	D113	Yes	Yes	94	G162	Yes	Yes
42	D114	Yes	Yes	95	G164	Yes	No
43	E091	Yes	No	96	G171	Yes	Yes
44	E092	Yes	No	97	G172	Yes	Yes
45	E101	Yes	No	98	G173	Yes	Yes
46	E102	Yes	Yes	99	G174	Yes	Yes
47	E103	Yes	Yes	100	G181	Yes	Yes
48	E104	Yes	Yes	101	G183	Yes	Yes
49	E111	Yes	Yes	102	H172	No	No
50	E112	Yes	Yes	103	H181	Yes	Yes
51	E113	Yes	Yes	104	H183	Yes	Yes
52	E114	Yes	Yes	105	J181	Yes	No
53	E121	Yes	Yes	106	J183	Yes	No