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NVE
NORWEGIAN
WATER RESOURCES AND
ENERGY ADMINISTRATION

Kjell Repp

LOW FLOW IN RUKWA REGION

Sumbawanga area

Mpanda area

Namanyere area



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Sammendrag/Abstract

The report gives details from runoff analyses in several rivers in Rukwa Region. New rating curves for several small rivers have been established in order to investigate water supply possibilities.

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SUMBAWANGA AREA

1.0 GENERAL DESCRIPTION OF THE AREA AND THE HYDROLOGY

Sumbawanga is located to the southwest of the Mbizi Mountains, which reach an altitude of 2453 m.a.m.s.l, while the town itself is located to approximately 1800 m.a.m.s.l. The highest mountains are covered by rainforest, which is gradually decreasing in size due to overexploitation, which is a result of the lack of firewood in the area.

The lower hillslopes are to a large part cultivated, while scattered trees, bush and woodland dominate the northern part of the mountains.

Numerous smaller rivers originate in the rainforest. Most of the rivers are perennial, even if the flow may drop to a very low level during dry years.

2.0 THE DATA BASE

2.1 General

Broken waterlevel records exist for quite a few of the rivers, while some additional rivers are covered by spot discharge measurements. The records are of a fairly bad quality, however, and the rating curves are highly questionable.

Compared to other parts of the region, the distribution of rainfall stations is acceptable. The spatial distribution of rainfall is very uneven, however, and earlier experience has shown that the representativeness of the rainfall stations most often is poor.

Observed rivers are shown on the mapsheet inside the backcover of the report, while Figure 2.1 outlines the periods of records in the area.

PERIODS OF RECORDS.

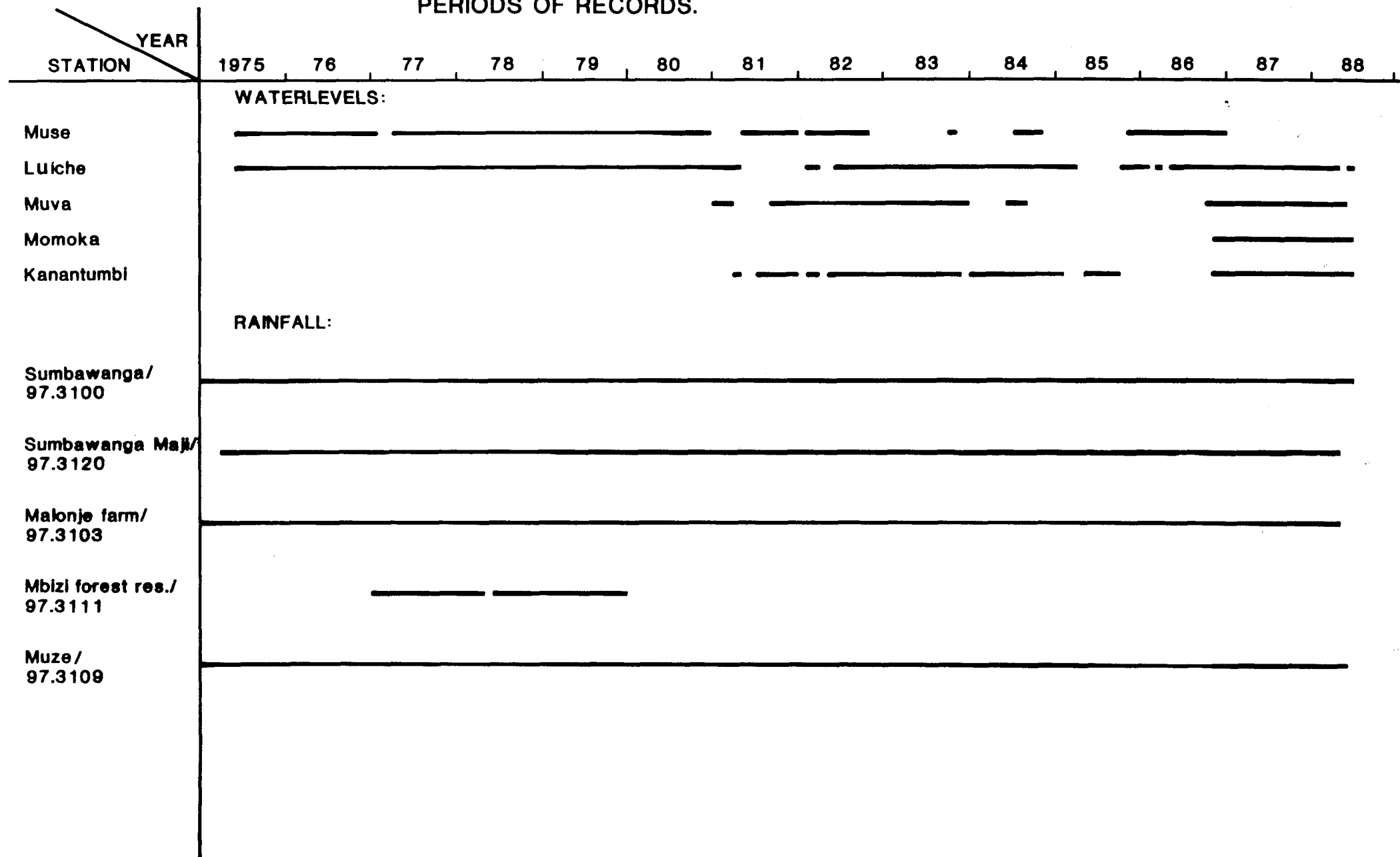


Figure 2.1 Periods of records

2.2 Kanantumbi River

The Kanantumbi River drains a catchment of 5.69 km², where approximately 1/4 is covered by rainforest, while the remaining area is dominated by open grassland and scattered bush and woodland. A staff gauge was established at the existing water intake in March 1981, and broken waterlevel observations exist up to October 1985, when the station was abandoned (Fig. 1). One year later, in October 1986, a permanent weir was constructed, in order to obtain more accurate and reliable runoff data. For the period 1981-85, the relationship between discharge and waterlevel is quite unclear, due to the poor quality of the rating curve. The discharge measurements carried out during the period are very scattered, and the calculation of the rating curve is questionable, since many of the measurements had to be cancelled.

Besides these reservations to the rating curve, the variations in waterlevel observations are very small, which may be explained by the frequency of observations. The waterlevel has only been observed once or twice a day, and the river is supposed to be very flushy, i.e. the oscillations in waterlevel are very fast. Therefore the highest water levels are only observed by coincidence.

2.3 Muva River

Daily water levels were measured just upstream of the existing water intake from December 1980 up to August 1984.

The catchment, which covers 6.36 km², is mostly dominated by woodland and bush. Only a very small part (< 5%) is covered by rainforest.

Regarding the data base, the situation is quite similar to the one at Kanantumbi River. The quality of the waterlevel observations as well as the discharge measurements are assessed to be at the same level.

A permanent weir was established in October 1986, from which month the observations are assumed to be quite acceptable, especially for the low flows.

2.4 Momoka River

The Momoka river, which covers a catchment of 6.47 km², was identified as a possible water source in 1986, after which a permanent weir was constructed in early 1986.

The quality of the data base is supposed to be fairly good, except for the fact that the period of records is very short. Grassland and scattered vegetation dominate the catchment.

2.5 Ndua River (Kiswite water intake)

The catchment to Ndua River at the confluence between the three rivers Ndua, Namansapo and Namtente comprises 23.79 km², i.e. a fairly large catchment when considering water supply purposes. The area, which is partly cultivated, consists of grassland and scattered trees.

Unfortunately, the river flow has not been regularly observed, and only 24 spot discharge measurements have been carried out during the period 1981 to 1988. As the measurements are very scattered, and some are carried out early in the dry season or in the rainy season, many of the measurements are unreliable.

2.6 Other rivers

All the rivers mentioned above drain towards the Luiche River, in which a hydrological station was established in 1975, covering the whole catchment. The station is located downstream of the escarpment, however, just before the river enters Lake Rukwa, and the data are not directly transferable to the upper parts of the catchment, and may be used only for a check of the shorter and broken records from the tributaries.

The Luiche River was measured at Katumba Village for quite a few years in the early eighties, however, and those data, even if being rather unreliable, may be transposed to the Ndua River.

Some other rivers, draining towards the Luiche river or directly down into the Rukwa Valley have been sporadically observed during one or several years.

2.7 Rainfall

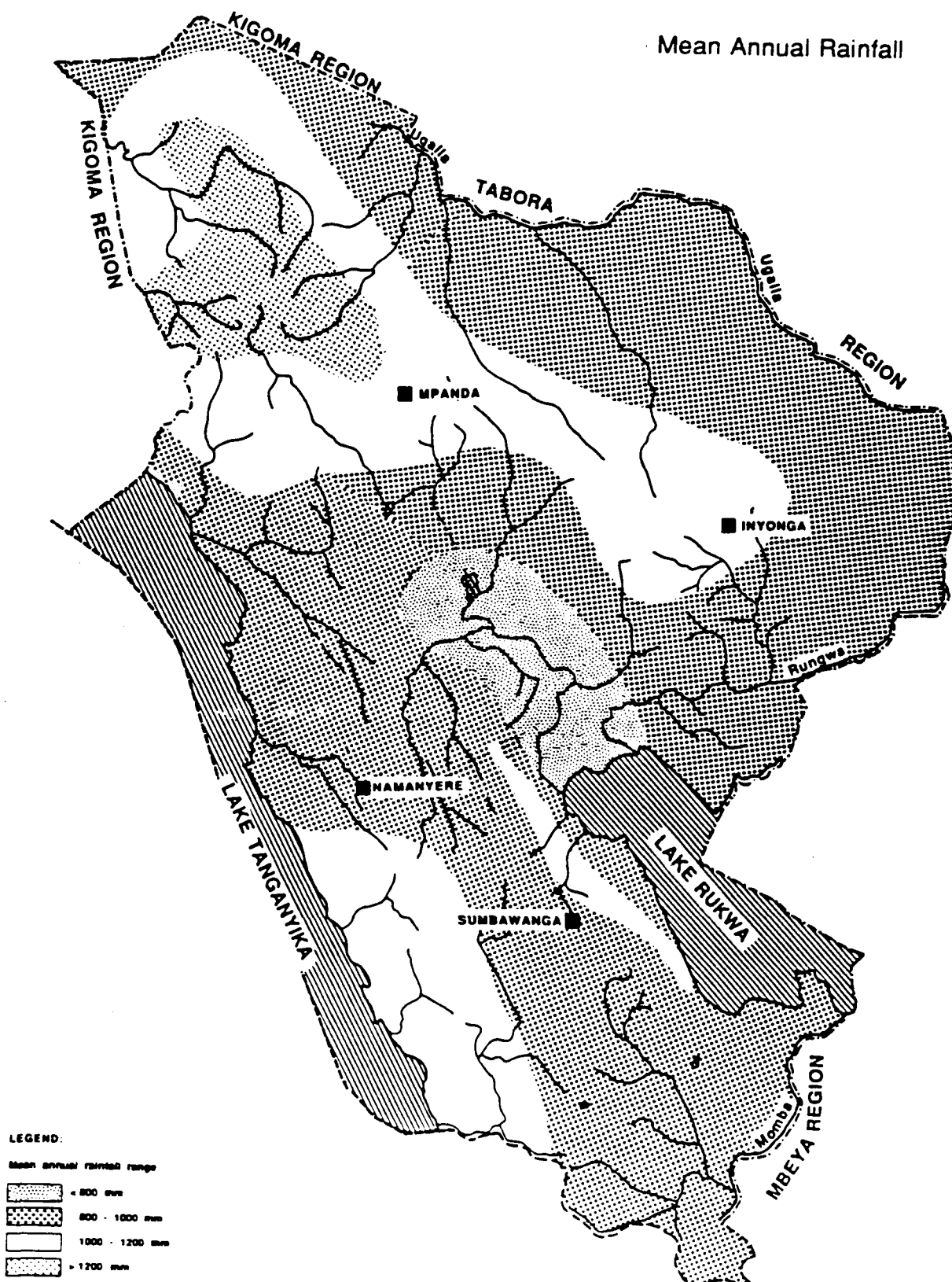
As mentioned earlier, the distribution of rainfall stations is fairly good.

Figure 2.1 shows the periods of records since 1975. The three stations Sumbawanga, Malone Farm and Muse have fairly long historical records, starting respectively in 1928, 1943 and 1954. Three new stations have been established lately, namely at Mawenzusi Prim. School, Wipanga Prim. School, and Mlanda Prim. School. Even if the records are very short (3-4 years), they may give some indications on the reliability of the estimated runoff values, as well as giving an indication on the increase of rainfall with altitude. It should be mentioned, however, that the rainfall pattern is rather complicated, due to large variations caused by the area's location close to the Rukwa escarpment. The average monthly rainfall at the various stations is given in Table 2.1.

Table 2.1: Mean monthly mm and annual rainfall at selected stations

Station Period	J	F	M	A	M	J	J	A	S	O	N	D	Cal. year	Hydr. year
Sumbawanga 1928-1987	153.3	143.9	156.2	95.4	20.3	2.9	0.3	0.8	5.0	12.9	79.4	160.6	831	835
Malonje 1943-1987	181.3	165.4	176.5	108.7	17.7	0.9	0.8	0.1	1.7	10.6	94.3	184.5	942	952
Muze 1954-1986	175.6	150.7	193.0	136.1	13.8	1.1	0.1	0	0.4	18.1	134.0	288.8	1052	1054

Comparisons between monthly rainfall at Wipanga Village and Sumbawanga during the last 2-3 years indicate approximately 35% increase in rainfall from Sumbawanga to Wipanga, which is located very close to the Kanantumbi River intake. Annual rainfall is shown on the following mapsheet.



3.0 RUNOFF ANALYSIS

3.1 General

Since the waterlevel records from the rivers Kanantumbi and Muva are short and broken, it has been decided to use the records from the Luiche river for correlation and statistical analyses, and the result scaled down using catchment areas and rainfall indicators to derive the runoff for Momoka and Ndua rivers. For a further check of the results at Ndua river, the earlier results from Luiche at Katumba will be used.

3.2 Rating curves

3.2.1 Kanantumbi River

The rating curve is shown in Figure 3.1. By excluding some measurements which are evidently wrong, the curve, which seems to be fairly acceptable, especially at low flows, is described by the function $Q = 1.9507 (H - 0.09)^{1.7956}$, where H is gaugeheight in metres and Q is discharge in m³/sec.

3.2.2 Muva River

The discharge measurements are very scattered, indicating a highly unreliable rating curve. By excluding the measurements giving the highest deviations, however, the remaining measurements gave as a result the curve shown in Figure 3.2, and described by the function $Q = 3.6955 (H - 0.05)^{2.5922}$

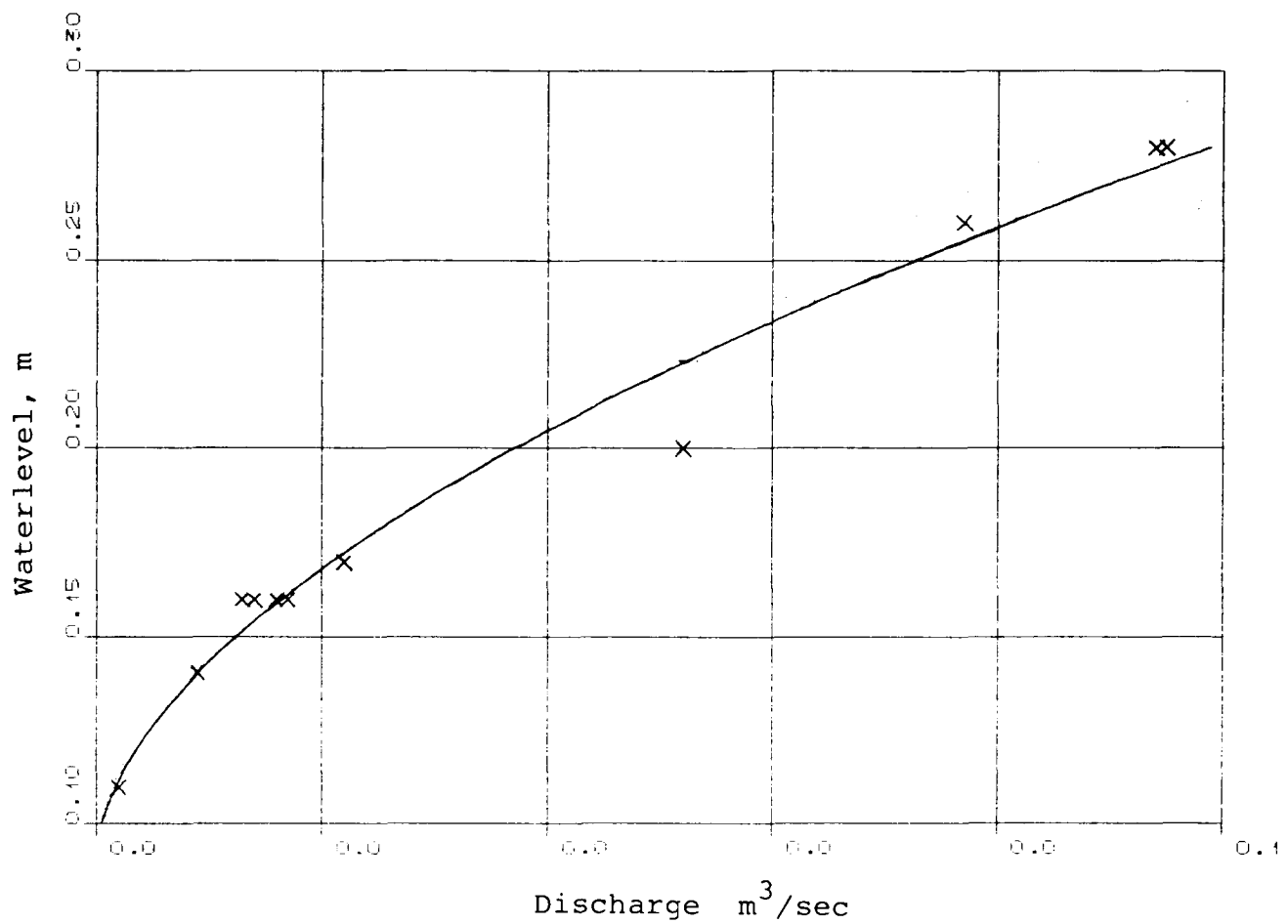


Figure 3.1. Discharge rating curve for the Wipanga station in Kanantumbi River.

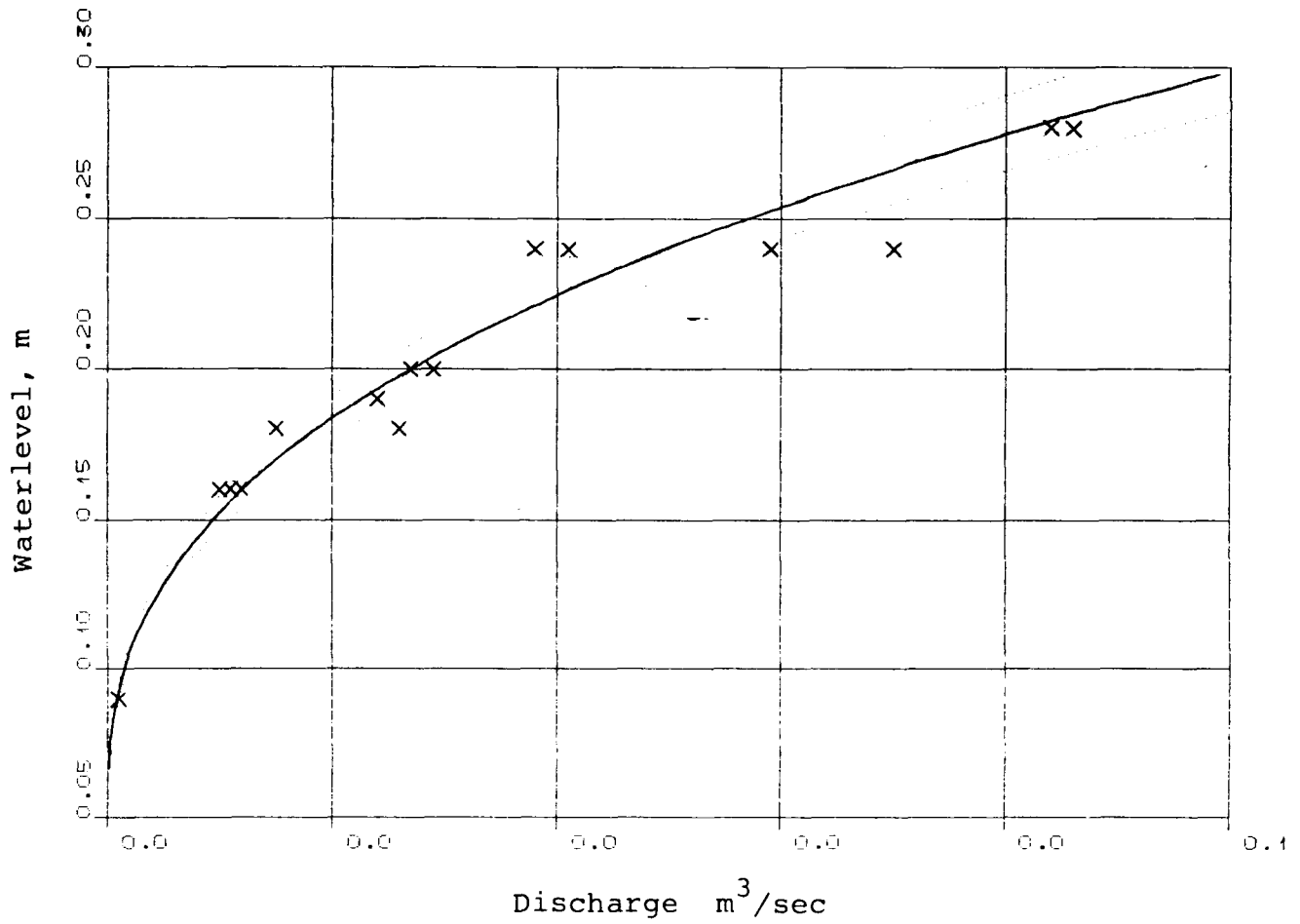


Figure 3.2. Discharge rating curve for the Muva station in Muva River.

3.2.3 Luiche River

The assessment of the rating curve for the Luiche river was rather complicated, since the discharge measurements indicated changes of the control. By first plotting the measurements from 1975 up to 1977, and then plotting the few measurements carried out during the years 1979 to 1981, it was found that the latter period gave a slightly higher curve, i.e. it gave lower discharges for the same water levels compared to the earlier period. Compilation of the curve for the period 1981-88 resulted in a new curve almost identical to the one covering the earliest period. Since the scarce information on the station and the few discharge measurements carried out during the year 1977 up to 1982 made it impossible to identify any changes of the control, it was decided to use one rating curve covering the whole period. The curve, which is described by the function

$$Q = 9.7766 (H-0.24)^{2.8383}$$

is shown in Figure 3.3.

3.2.4 Permanent weirs

for the three 90° sharp-crested weirs which are now installed in the rivers Kanantumbi, Muva and Momoka has been used the equation

$$Q = 1.4 \cdot H^{2.5}$$

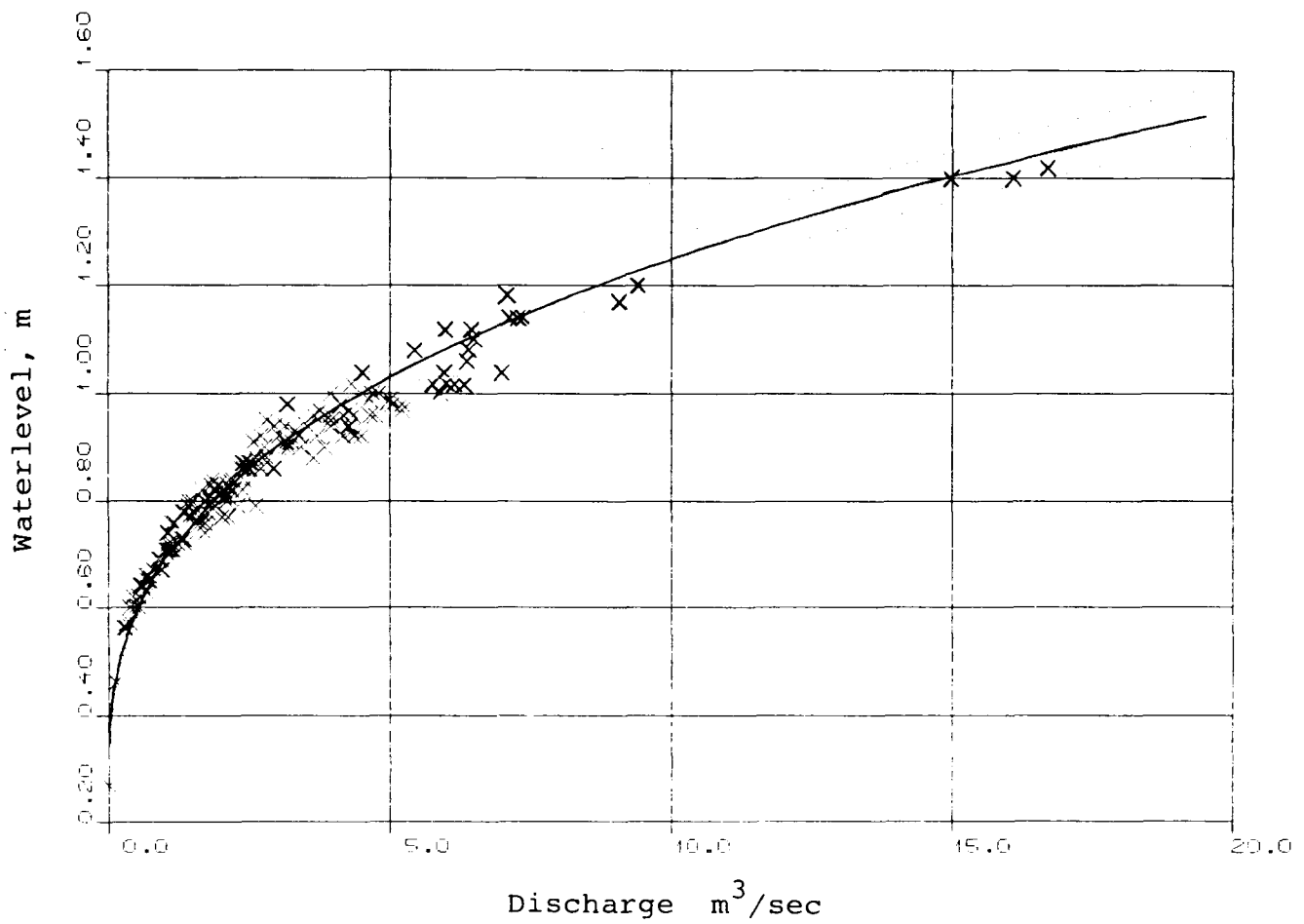


Figure 3.3 Discharge rating curve for the Luiche River.

3.3 Daily runoff

Daily waterlevel data have been converted into daily discharges by using the rating curves and equations described in chapter 3.2.

Daily discharges are tabulated in Appendix 1.

3.4 Monthly and annual runoff

Monthly mean discharges for the various rivers are shown in Figures 3.4 to 3.7. Mean monthly and annual values for all stations are listed in Appendix 2.

Attempts were made to fill in some of the missing data in the Luiche records by correlation with the Muze river, but without any success.

Specific runoff at Luiche is given in Table 3.1, for comparisons with the alternative intake sites.

Table 3.1: Mean monthly specific runoff at selected places
l/sec - km²

Place	J	F	M	A	M	J	J	A	S	O	N	D	year
Luiche	7.5	8.6	9.4	9.2	5.6	2.7	1.8	1.2	0.7	0.5	1.0	3.9	4.3
Muva	4.9	7.7	7.4	9.0	7.4	5.7	4.6	3.5	3.0	3.0	3.6	6.5	6.0
Momoka	5.7	7.3	9.0	8.8	4.6	3.9	2.9	2.3	1.7	2.3	2.0	4.0	5.3
Wipanga	11.8	11.4	13.7	11.8	7.0	5.8	5.3	4.6	4.0	3.5	4.6	12.8	8.0

Considering the varying periods of records, however, these data are not strictly comparable. The specific runoff for the period 1 Nov. 1986 to 31 Oct 1988 is therefore shown in Table 3.2.

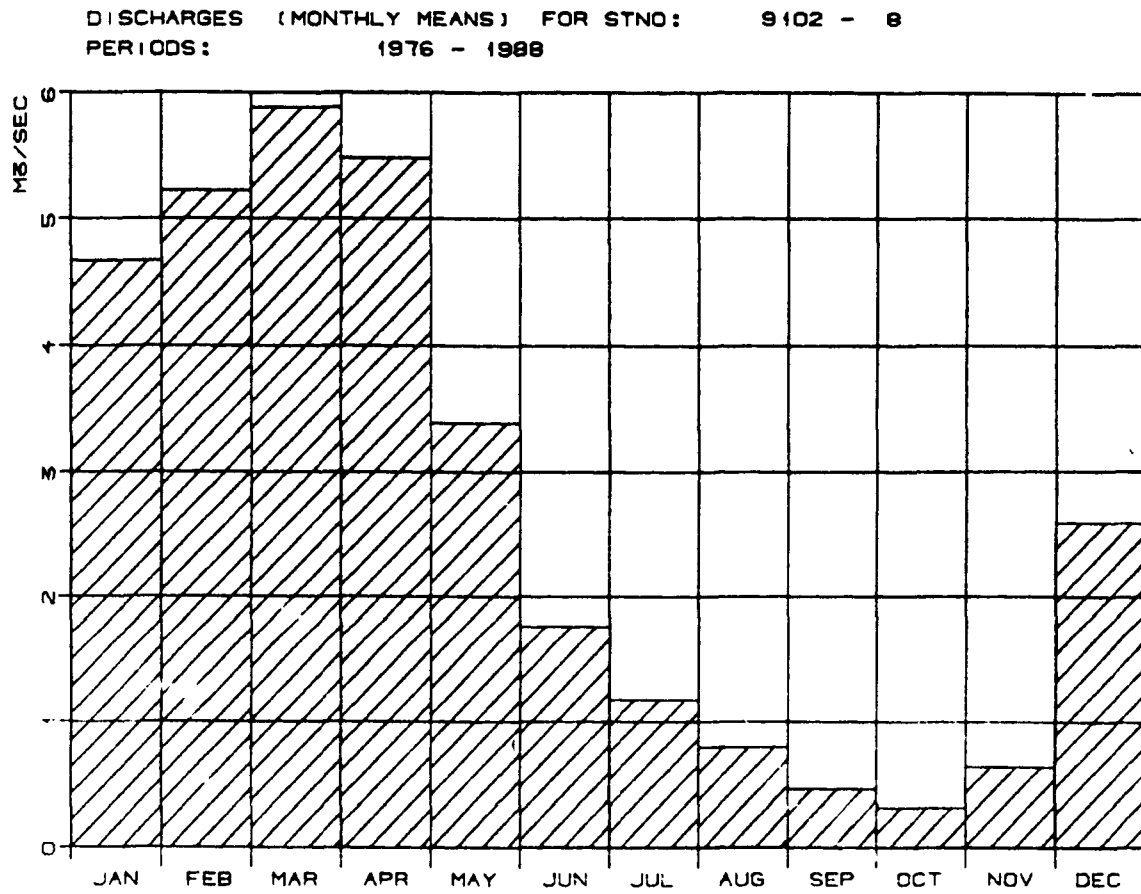


Figure 3.4 Monthly mean discharges at Luiche/Uzia.

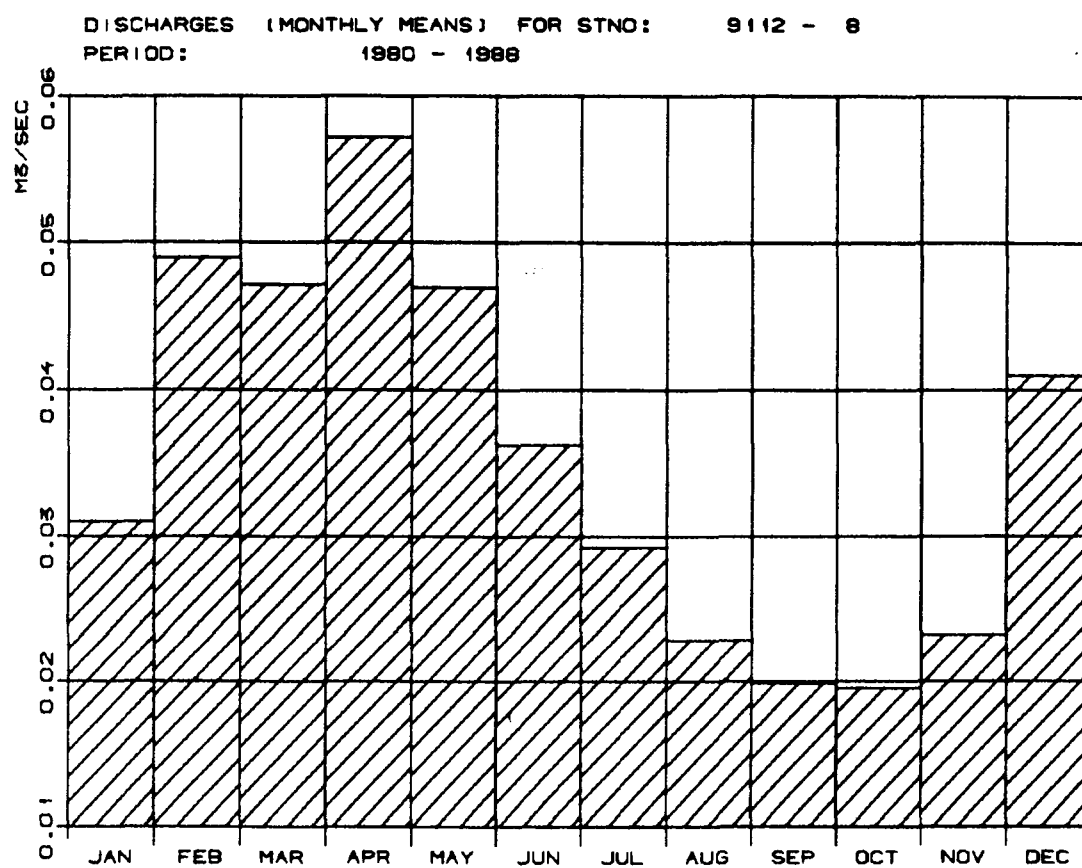


Figure 3.5 Monthly mean discharge at the Muva intake.

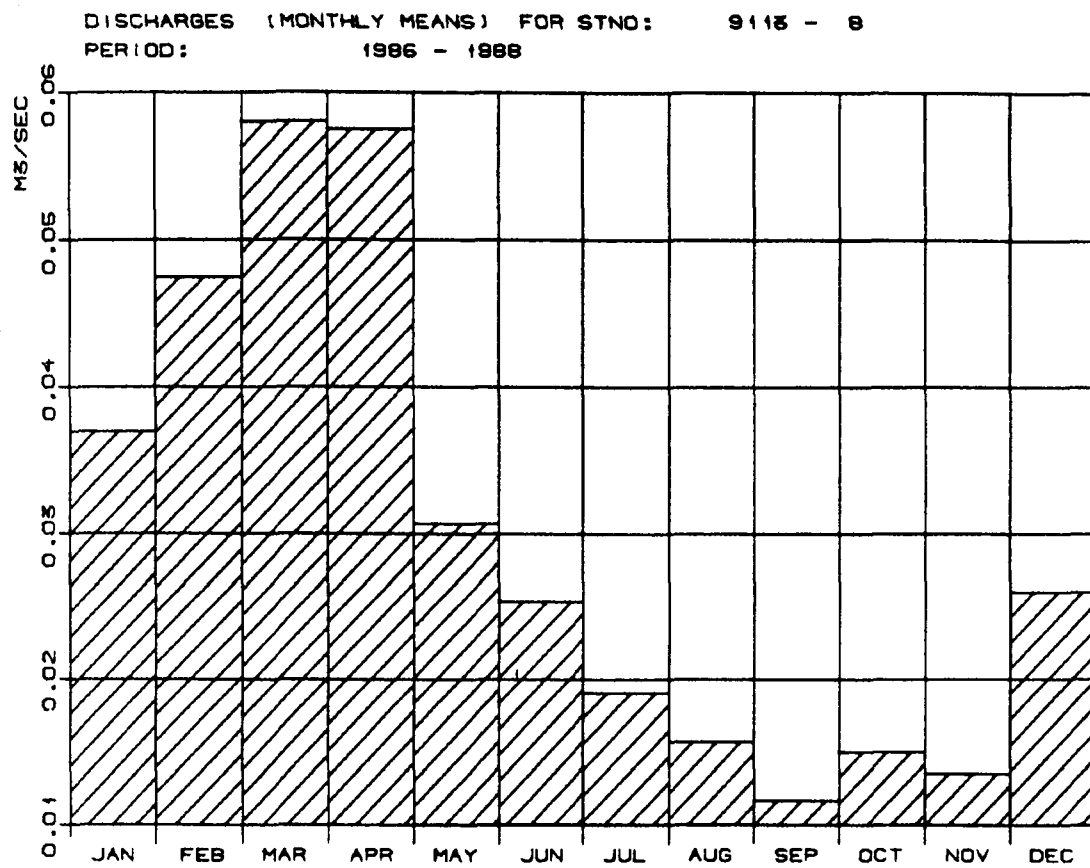


Figure 3.6 Monthly mean discharges at the proposed water intake in Momoka river.

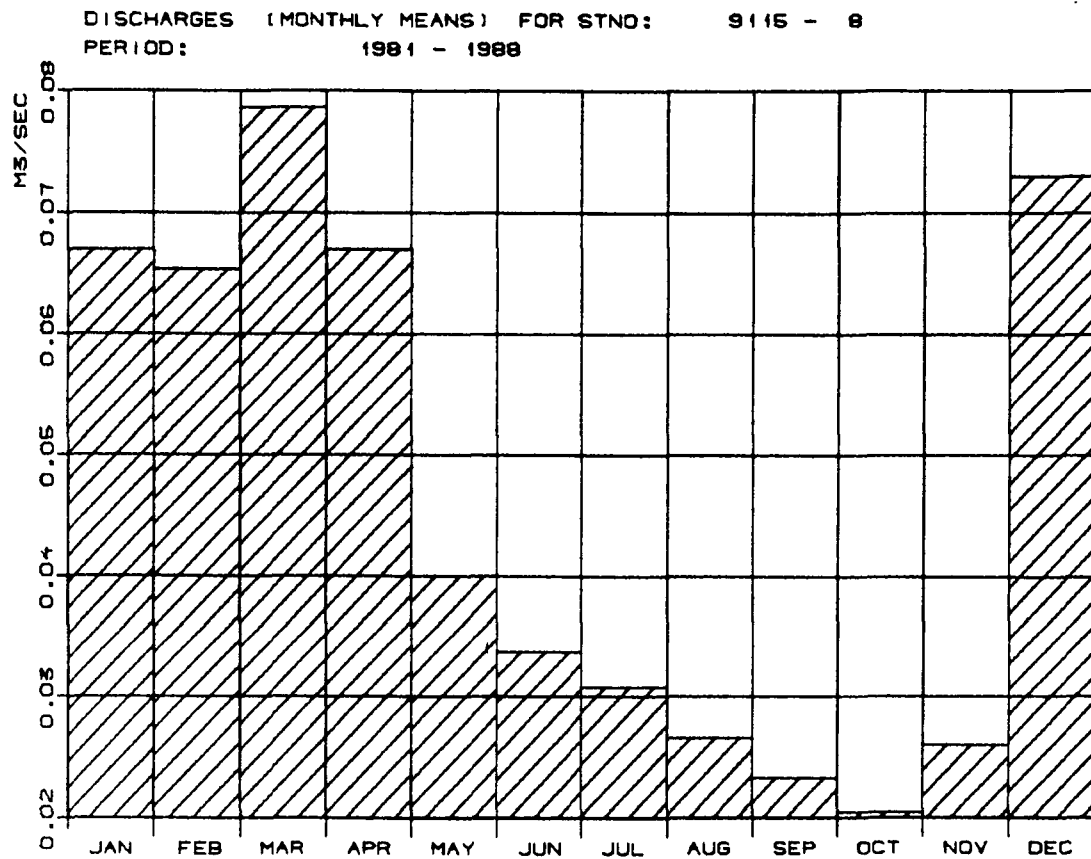


Figure 3.7 Monthly mean discharges at the existing water intake in Kanantumbi river.

Table 3.2: Specific runoff at selected places for the period 1. Nov. 1986 up to 31. Oct. 1988.

l/sec - km ²													
Place	J	F	M	A	M	J	J	A	S	O	N	D	year
Wipanga	9.0	11.7	12.4	11.7	9.2	7.4	5.8	5.0	4.3	4.0	4.6	6.6	7.6
Muva	7.1	7.7	7.9	7.6	6.6	5.4	4.4	3.9	3.9	3.8	4.3	6.6	5.8
Momoka	5.7	7.3	9.0	8.9	5.0	4.3	3.1	2.7	1.9	1.8	2.1	4.0	4.7
Luiche	9.0	17.4	12.3	11.5	7.4	4.1	3.1	2.1	1.3	0.9	1.9	7.3	6.5

As can be seen from the tables above, the distribution pattern is rather similar in the two tables, except for the Luiche R., where the specific runoff during the latter period is rather high, compared to the mean values. When examining the table 3.2 closer, it is revealed that the runoff in early 1987 was very high in the Luiche R. compared to the stations further south. This might probably be explained by an uneven rainfall distribution in 1987; an explanation which is confirmed by the scattered rainfall observations.

Further comparisons between the monthly runoff at the various stations indicate that the values from Muva are the most unreliable ones, especially the records from 1981 up to 1984. Heavy emphasis has therefore been placed on the records from 1986 to 1988, after the three permanent weirs were established.

3.5 Flow duration

Flow duration curves for the various intake sites have been worked out as shown in Figures 3.8 to 3.11.

A flow duration curve usually gives the percentage of time that certain values of discharge were equalled or exceeded. The curve establishes base flow, while the area beneath it represents total volume of water available. Additionally the curve provides some information on topographical and geological characteristics of the catchment.

For this purpose, and for easier comparisons between the various catchments, the curves are non-dimensional.

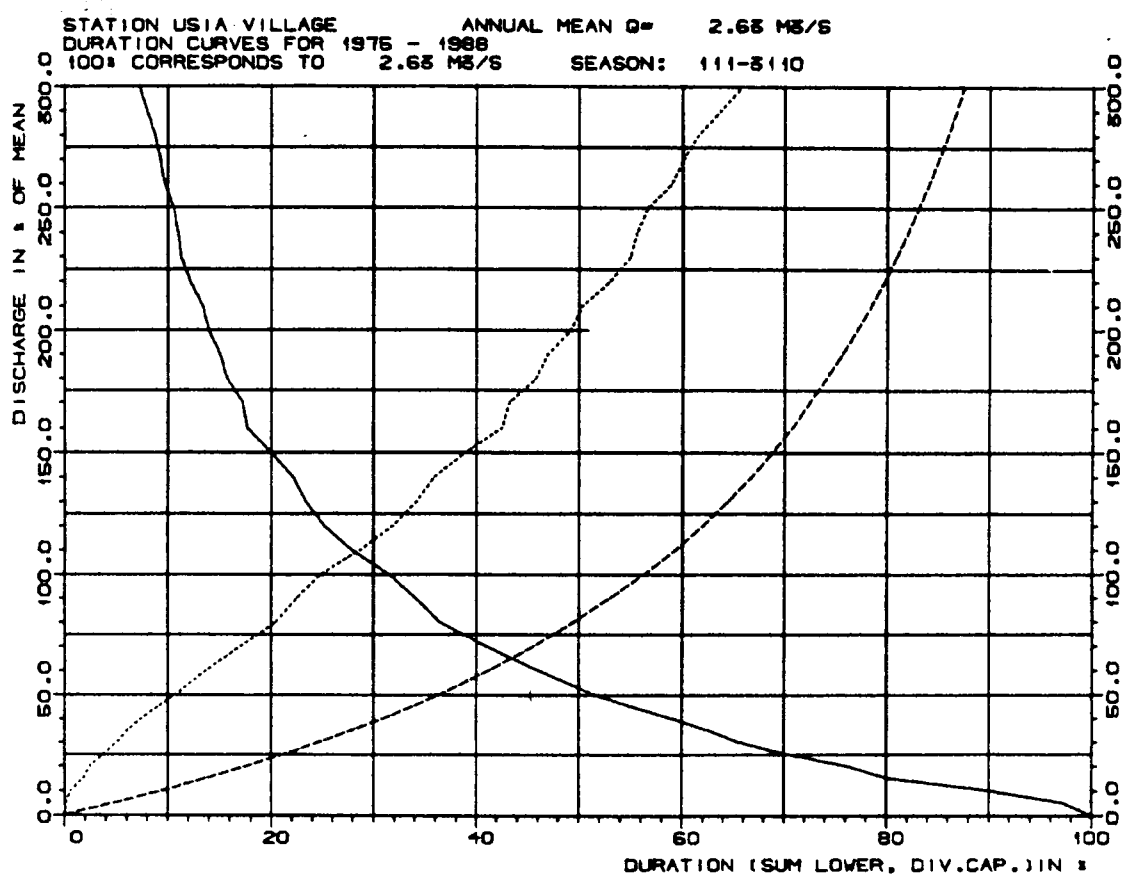


Figure 3.8 Flow duration for the Luiche River at Uzia.

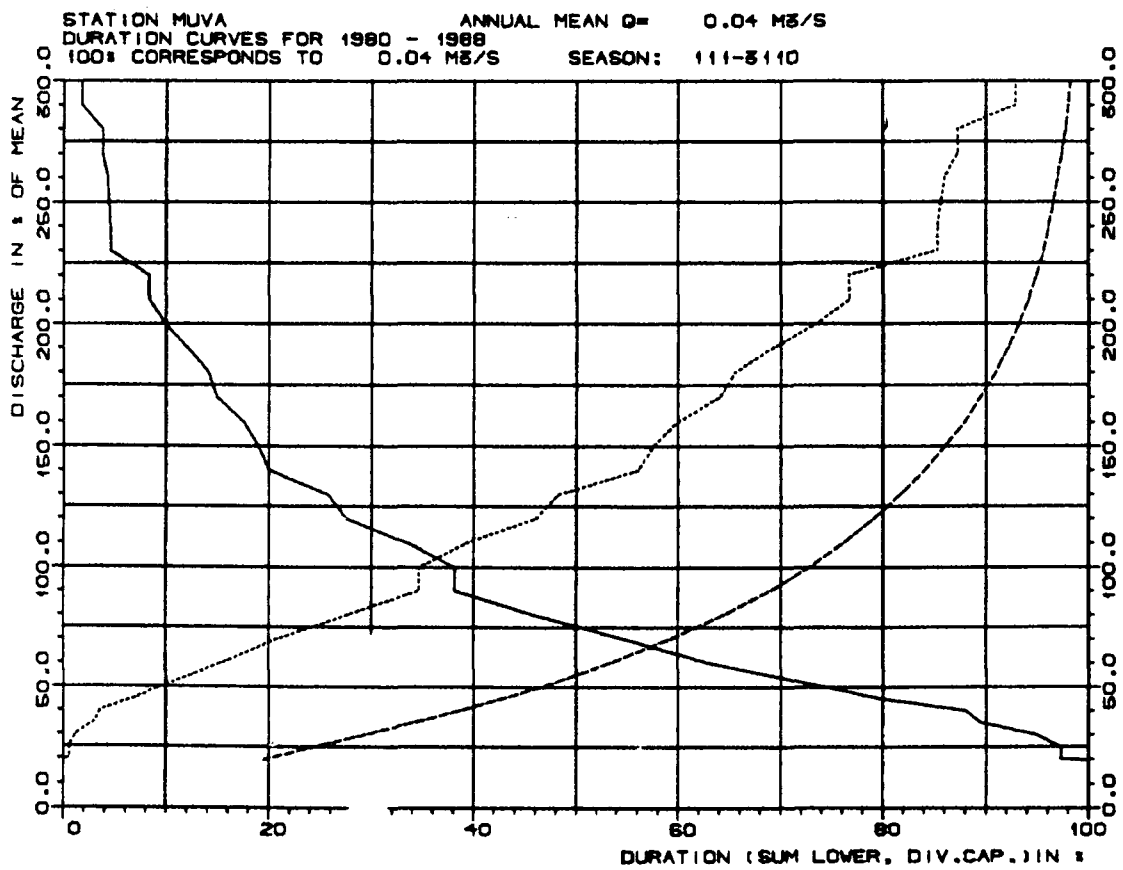


Figure 3.9 Flow duration curve for the Muva river (existing intake).

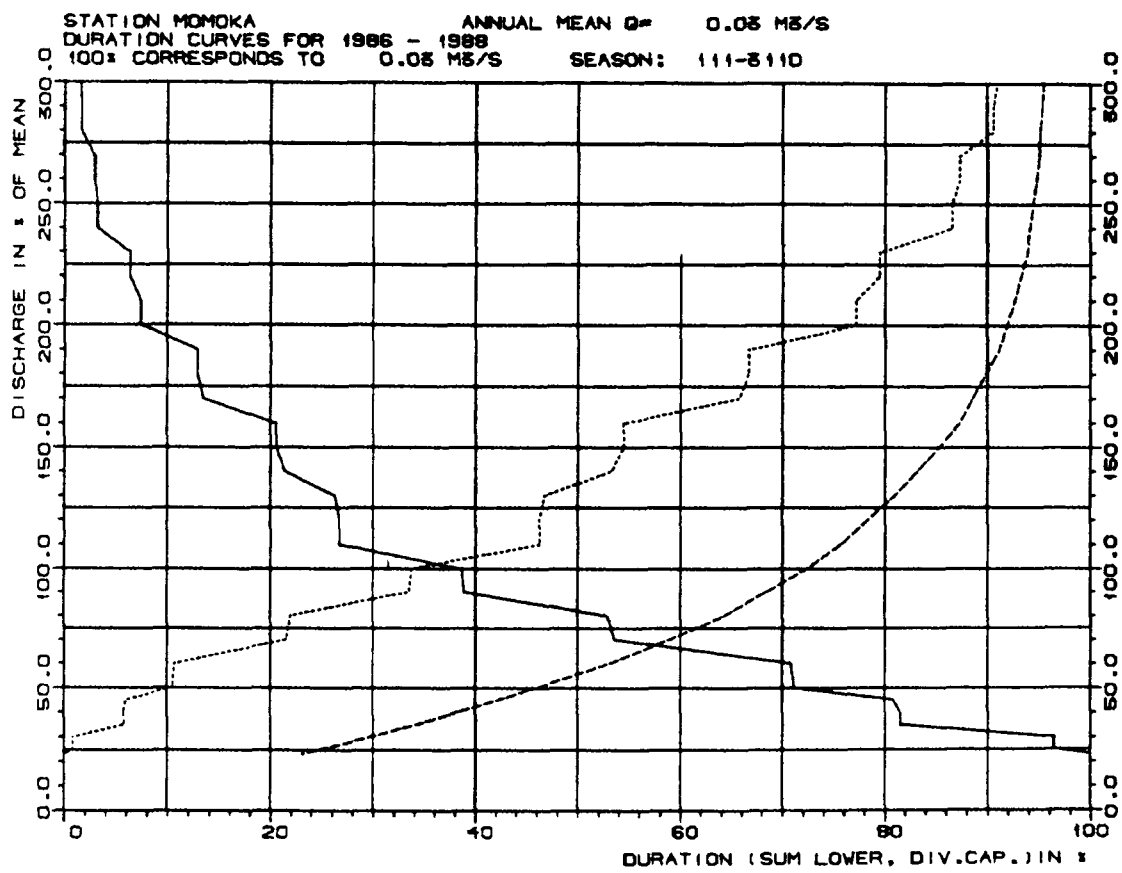


Figure 3.10 Flow duration curve for the Momoka River (at proposed intake).

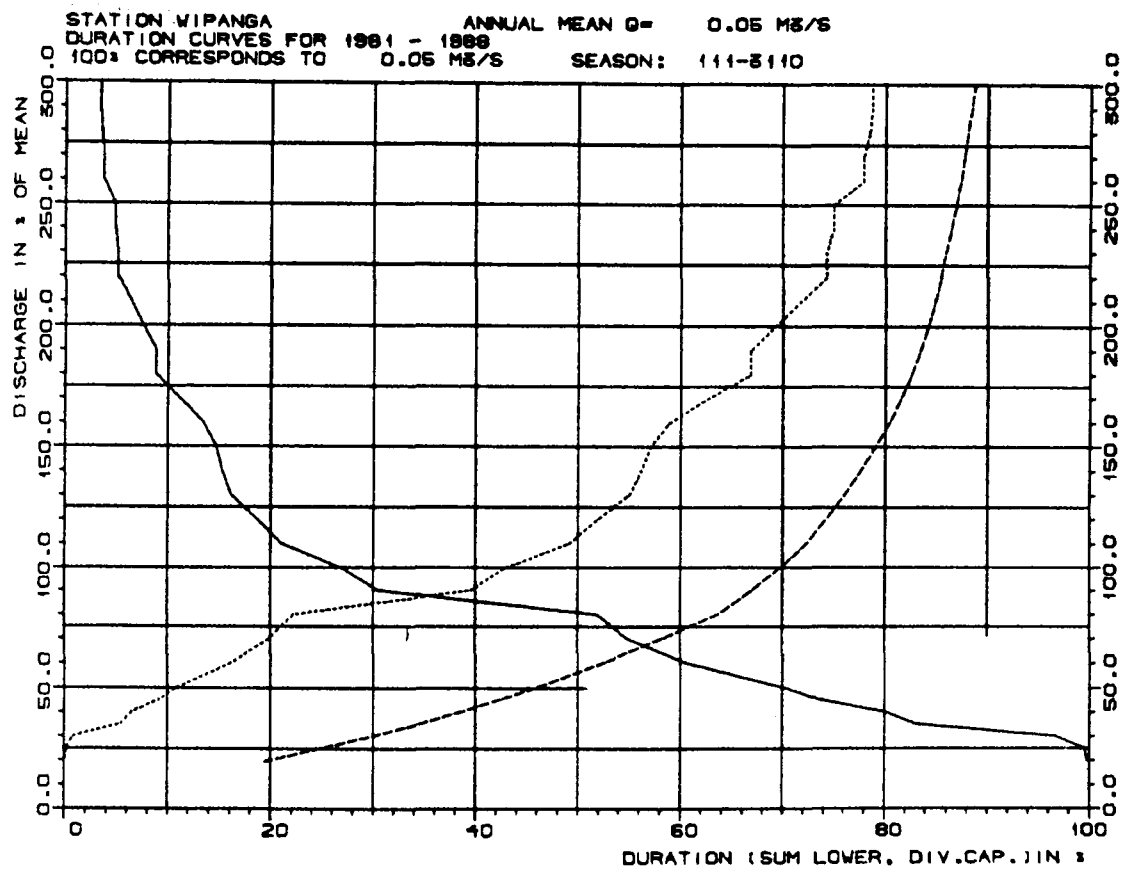


Figure 3.11 Flow duration curve for the Kanantumbi River
 (existing intake).

The curves from the rivers Muva, Momoka and Kanantumbi are very irregular, with stepwise increase or decrease, due to the short periods of records and the small variations in water levels, especially during the dry season.

It should also be noted that the curves are only based on complete hydrological years of records, which means that all years with gaps in the records are excluded. Complete years for each river are given in table 3.3.

Table 3.3. Complete years of records for each river.

River Year	Luiche	Muva	Momoka	Kanantumbi
1975/76	x			
- /77	x			
- /78	x			
- /79	x			
- /80	x			
- /81				
- /82		x		
- /83	x	x		x
- /84	x			x
- /85				
- /86				
- /87	x	x	x	x
- /88		x	x	x

3.6 Low flow analyses

3.6.1 Methodology

In the Water Master Plan for Rukwa Region a very simple method was used to assess the low flows for various return intervals (WMP, volume 7). As the data base has increased, more sophisticated methods have been considered. The short and broken waterlevel records as well as discharge measurements are still a severe obstacle, however. For the stations with daily waterlevel observations, except for Momoka, where only 2 years of data are available, various frequency distributions have been tried, in order to statistically assess the low flow with varying return intervals.

Of the various distributions, the log-normal 2 parameter, Gumbel, and the Gamma 2 parameter distribution were found to give the best fit. The log-normal, which is a world-wide used method in low flow analyses, was therefore chosen as the most reliable one. It should be mentioned, however, that the variations between the three distribution functions were negligible, and the results were identical when considering low flows with return intervals from two to fifty years.

Where complete records were available, the statistical analyses were carried out based on the average of the ten lowest daily readings for each year. For a few years, however, the analyses were only based on one or two spot discharge measurements near the end of the dry season.

3.6.2 Muva River

The low flow distribution and various return intervals are shown in Table 3.4 and Figure 3.12, while Table 3.5 lists the discharge measurements carried out prior to the installation of the weir.

Table 3.4 Low flows at the existing water intake at Muva.

	Return interval, years			
	2	5	10	20
Flow, l/sec	13	9	7	6

Average low flow for eight years of records is 14 l/sec.

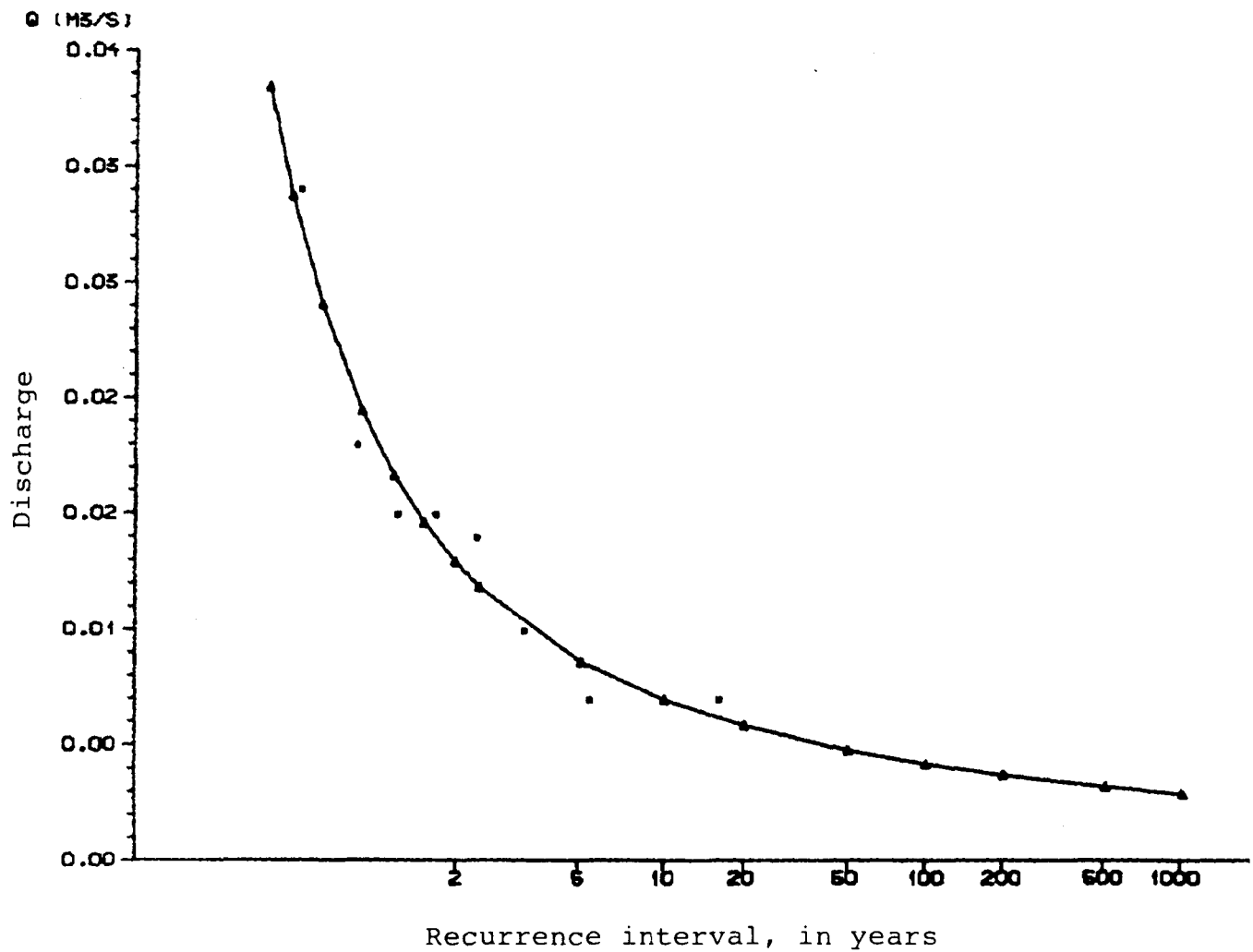


Figure 3.12 Annual minimum flow (10 day average) at Muva river (existing intake).

Table 3.5 Discharge measurements at existing water intake, Muva River, Muva

Day/Month/Year	Waterlevel m.	Discharge m ³ /sec	Comments
11.12.1980	0.20	0.029	
12.12.1980	0.20	0.027	
14.04.1981	0.24	0.070	
16.04.1981	0.24	0.059	
22.06.1981	-	0.041	
24.06.1981	-	0.038	
19.09.1981	0.19	0.024	
25.11.1981	0.17	0.074	Doubtful
05.05.1982	0.18	0.011	Doubtful
05.05.1982	0.18	0.012	Doubtful
12.05.1982	0.18	0.026	
12.05.1982	0.18	0.021	Doubtful
19.05.1982	0.18	0.015	
26.07.1982	0.16	0.011	
17.08.1982	0.16	0.007	
25.08.1982	0.16	0.012	
30.09.1982	0.16	0.010	
06.07.1983	0.24	0.019	
15.06.1984	0.16	0.010	
02.10.1984	0.17	0.008	
01.11.1984	-	0.007	
30.04.1985	0.28	0.084	
30.04.1985	0.28	0.086	
24.05.1985	0.16	0.058	
08.08.1985	0.10	0.041	
17.10.1985	0.08	0.032	
30.10.1985	0.08	0.029	
29.05.1989	-	0.032	
18.09.1989	-	0.028	

Table 3.6 Discharge measurements at proposed water intake, Muva River

Day/Month/Year	Waterlevel m.	Discharge m ³ /sec	Comments
06.03.87	-	0.048	
23.03.87	-	0.060	
01.04.87	-	0.057	
18.04.87	-	0.038	
20.05.87	-	0.053	
06.10.87	-	0.026	
01.10.88	-	0.019	
25.10.88	-	0.013	
29.05.89	-	0.047	
19.08.89	-	0.032	
18.09.89	-	0.022	

Another possible water intake has been identified approximately 1.5 km upstream of the old one (4.78 km²). For estimation of the design flow, the values in Table 3.4 should be reduced by 20%.

3.6.3 Momoka River

The annual minimum flow in the Momoka river has only been observed since the 1986 dry season, i.e. the records are too short to carry out any frequency analyses on. Based on the years 1986-88 (3 years), the relationship between the low flows in Muva river compared to Momoka river has been assessed to 15 l/sec to 8 l/sec (average minimum flow), while the relationship between mean annual flow is respectively 35 l/sec. to 30 l /sec. Compared to the mean annual flow in the two rivers, the difference in low flow is much bigger, which is caused by less rainfall and a faster flow recession in the Momoka river. This case shows that transposing data from one catchment to another by using mean annual flow and catchment area may introduce large errors in the analyses. The low flows of various return intervals have been derived by using rainfall statistics as well as using the relationship between low flow (1986-88) in the Muva and Momoka rivers, i.e. multiplying the results in Table 3.4 by a factor of 0.533 (15 l/sec to 8 l/sec).

The average result of the two methods is given in Table 3.7.

Table 3.7 Estimated low flows at the proposed water intake in Momoka River.

	Return interval, years			
	5	10	20	Mean
Flow, l/sec	6	5	4,5	8

3.6.4 Kanantumbi River

The annual flow as well as the low flow of the Kanantumbi river is slightly higher compared to the Muva river, which is easily explained by the rainfall distribution and the catchment characteristics.

Located at higher altitude and more exposed, the Kanantumbi catchment receives approximately 10-20% higher rainfall. The

flow recession in the Kanantumbi river is also slower, due to the heavier vegetative cover of the catchment.

The low flow distribution and return intervals are shown in Table 3.8 and Figure 3.13, while the spot discharge measurements carried out prior to the establishment of the weir are listed in Table 3.9.

Table 3.8 Low flows at the existing water intake in Kanantumbi River at Wipanga Village

	Return interval, years				Mean
	2	5	10	20	
Flow, l/sec	15	11	10	9	16

Table 3.9 Discharge measurements at existing water intake,
Kanantumbi River, Wipanga

Day/Month/Year	Waterlevel m.	Discharge m ³ /sec	Comments
11.12.1980	0.25	0.033	Poor measuring section Current meter, malfunct. Flow estimated to 40 l/sec See file
20.06.1981	0.20	0.052	
24.06.1981	0.20	0.052	
06.07.1981	0.20	0.075	
19.11.1981	0.17	0.022	
25.11.1981	0.18	0.046	
12.05.1982	0.16	0.223	
21.07.1982	0.16	0.026	
17.08.1982	0.16	0.014	
17.08.1982	0.16	0.014	
25.08.1982	0.16	0.017	
25.08.1982	0.16	0.016	
30.09.1982	0.16	0.013	
08.10.1982	-	0.017	
09.05.1983	0.20	0.057	
06.07.1983	0.20	0.032	
09.08.1984	0.16	0.017	
02.10.1984	0.16	0.013	
02.11.1984	0.14	0.009	
29.04.1985	0.28	0.094	
29.04.1985	0.28	0.095	
10.05.1985	0.26	0.077	
08.08.1985	0.26	0.040	
17.10.1985	0.15	0.030	
30.10.1985	0.14	0.023	
02.06.1986	-	0.061	
29.05.1989	-	0.058	
19.08.1989	-	0.028	
18.09.1989	-	0.032	

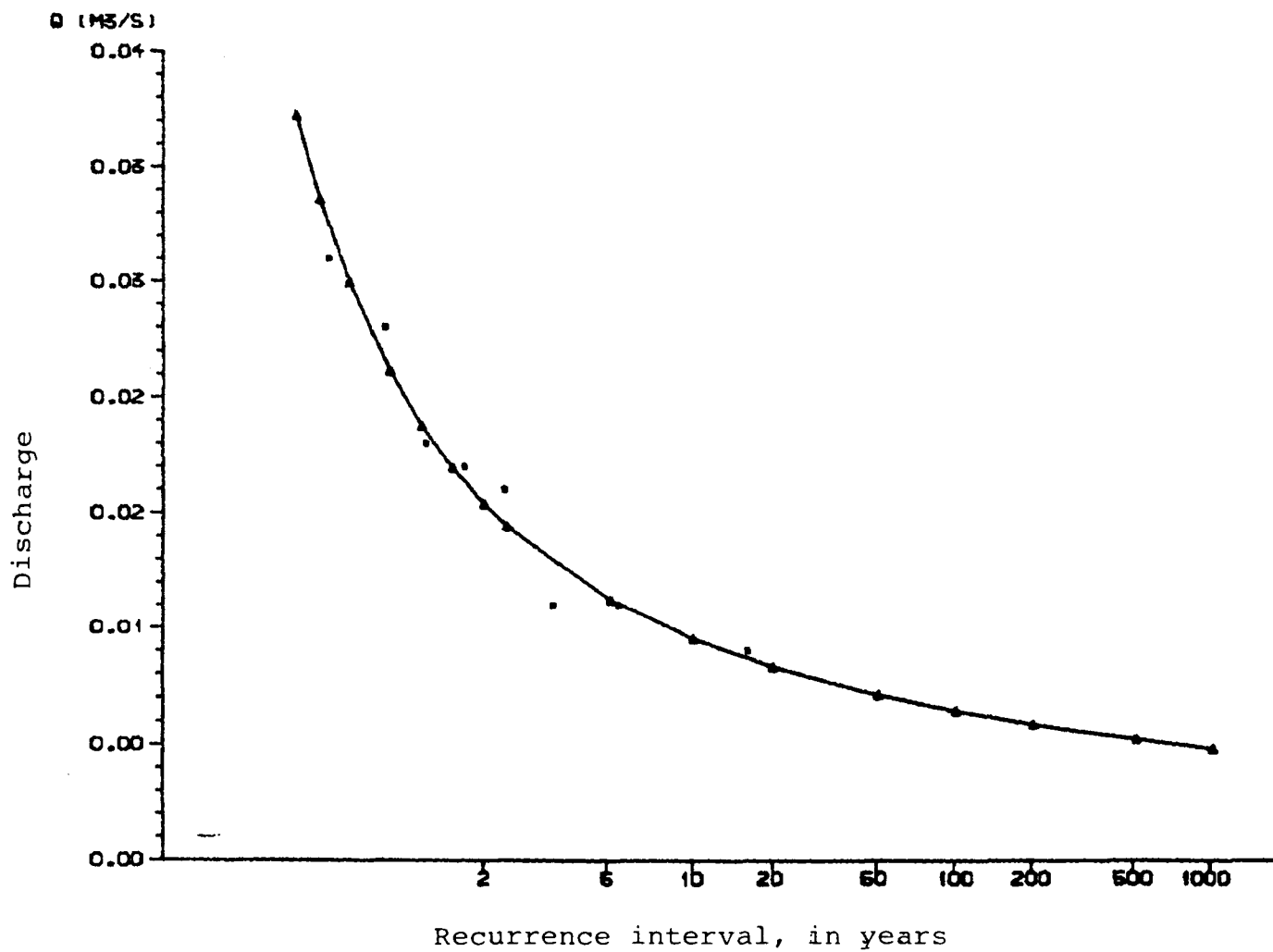


Figure 3.13 Annual minimum flow (10 days average) at Kanantumbi river (existing intake).

3.6.5 Ndua River

As shown in Table 3.10, the spot discharge measurements carried out in the Ndua River are very scattered and rather confusing. The flow has been measured just upstream of the new water intake, which covers a catchment of 17,2 km². The size of the catchment would indicate a low flow considerably higher than the flows observed from the smaller catchments further west. In 1984, which was an extremely dry year, and in 1988, the flow dropped to respectively 1 l/sec. and 4 l/sec., however. The lower and flatter part of the catchment is rather heavily cultivated, and a lot of water is probably drawn by the plants.

Assuming that the measurements are reliable, the 5, 10, and 20 years low flow is estimated to respectively 4, 2 and 1 l/sec, while the average low flow is estimated to 9 l/sec.

The results are also confirmed by sporadic observations by the Advisory Hydrologist during earlier visits in the area. In late October 1984 the flow in Luiche River at Katumba was measured to 4.4 l/sec (125 km²), which gives an even lower specific yield compared to Ndua river. The two catchments are close to each other, and have very similar characteristics.

Table 3.10 Discharge measurements, Ndua River, Kiswite Water Intake

Day/Month/Year	Discharge, m ³ /sec		
	Namansapo R.	Namtente R.	Nduwa R.
07.08.1981	0.004	0.010	0.039
09.06.1982	0.002	0.003	0.012
14.08.1982	0.002	0.002	0.010
03.07.1984	0.001	0.002	0.042
01.11.1984	-	-	0.001
02.05.1985	-	-	0.254
17.05.1985	-	-	0.177
12.10.1985	-	-	0.025
14.10.1985	-	-	0.014
15.10.1985	-	-	0.016
16.10.1985	-	-	0.015
17.10.1985	-	-	0.014
07.05.1986	-	-	0.108
15.05.1986	0.015	0.010	0.080
21.07.1986	0.006	0.008	0.043
24.07.1986	0.006	0.008	0.033
03.10.1986	0.004	0.004	0.009
01.08.1987	0.008	0.010	0.058
29.09.1987	0.008	0.007	0.031
29.12.1987	0.005	0.007	0.014
09.02.1988	0.030	0.018	0.069
28.03.1988	0.028	0.026	0.224
13.05.1988	0.011	0.007	0.025
27.07.1988	0.006	-	0.014
10.10.1988	0.005	-	0.004
29.10.1988	-	-	0.001
29.07.1989	0.010	0.010	0.042
05.09.1989	0.0065	0.0145	0.021
07.06.1989	0.015	0.014	0.128

3.6.6 Mzika River

The Mzika catchment (3.28 km²) is very similar to that of Kanantumbi river, and the same flow regime is assumed to prevail.

All discharge measurements carried out at the existing water intake in Mzika River are listed in Table 3.11. Comparisons with the nearby Kanantumbi river indicate a slightly lower specific runoff in the latter one. If neglecting this small difference, and transposing the design flows calculated for the Kanantumbi river by adjusting for the difference in catchment size, the 5, 10 and 20 year low flow is estimated to respectively 7, 6, and 5 l/sec, while average low flow is estimated to 13 l/sec. These values coincide fairly well with a frequency analysis carried out on the very short records from the Mzika river.

Table 3.11. Discharge measurements at existing water intake,
Mzika River, Wipanga

Day/Month/Year	Discharge m ³ /sec
09.05.1983	0.038
02.10.1984	0.006
02.11.1984	0.004
10.05.1985	0.044
08.08.1985	0.027
17.10.1985	0.019
29.04.1986	0.046
29.04.1986	0.049
08.05.1986	0.045
19.05.1986	0.036
02.06.1986	0.027
17.07.1986	0.025
29.07.1986	0.027
14.08.1986	0.024
04.10.1986	0.015
16.10.1986	0.016
29.07.1987	0.030
07.10.1987	0.019
27.11.1987	0.017
27.01.1988	0.029
18.03.1988	0.023
13.05.1988	0.021
02.07.1988	0.016
19.07.1988	0.013
01.10.1988	0.009
29.05.1989	0.039

3.6.7 Mteteze (Kakasi or Vuma) River

The Mteteze River drains the northeastern slopes of the Mbizi Mts. and flows straight down into the Rukwa Valley.

More than 70% of the catchment (total area 5.67 km²) is covered by forest or rainforest, which indicates a rather stable flow during the dry season. The exact location of the proposed water intake has not yet been settled, and this description and the design flow estimates are referring to the sites shown on the mapsheet inside the backcover of this report.

The annual minimum flow has been measured in 1984, 1988 and 1989 as shown in table 3.12. The observation in December 1987 is probably too high, since the rain had already started by that time.

Table 3.12 Discharge measurements at the proposed water intake, Mteteze River.

Day/Month/ Year	River	Place	m ³ /sec	Catchm. area km ²
18.07.1983	Mteteze (Kakasi)	Mbizi Forest	0.068	5.67
07.11.1984	"	"	0.015	
08.12.1987	"	"	0.033	
18.10.1988	"	"	0.024	
04.11.1988	"	"	0.018	
01.08.1989	"	u/s	0.042	
"	"	d/s	0.054	
18.09.1989	"	u/s	0.034	
"	"	d/s	0.037	

Comparisons with the Kanantumbi river flow indicate a low flow which is approximately 1.6 times higher than the flow of the Kanantumbi river, which directly transferred to the Mteteze river gives the design flows as shown in table 3.13.

Table 3.13 Estimated low flows for the proposed water intake in the Mteteze river.

	Return Interval, years				
	2	5	10	20	Mean
	24	17,5 17,5*	16 16*	14,6 14*	26

*) derived from rainfall probability analyses

As can be seen from the table, the 5,10 and 20 year low flow derived by using rainfall statistics and correction factors from the hydrological year 1987/88 are of the same magnitude, which should imply that the results are fairly reliable.

3.6.8 Namabangasa River

The Namabangasa catchment, which comprises only 3.07 km², consists almost entirely of scrub and scattered trees, with very little cultivation.

The river was identified as a possible water source only recently, and consequently there are very few discharge measurements available. The lowest flow was measured on 4 November 1988 to 13 l sec, which is rather high, considering the small catchment area and the lack of vegetation. The high specific water yield of the area has been confirmed by earlier measurements further downstream, however, as shown in Table 3.14.

Table 3.14 Spot discharge measurements in the eastern branch of the Namabangasa/Mwambazi river system.

Day/Month/ Year	River	Place	m ³ /sec	Catchment area km ²
17.10.1988	Namabangasa R.	Mponda, prop. intake	0.015	3.07
04.11.1988	"	"	0.013	
02.06.1989	"	"	0.079	
01.08.1989	"	"	0.028	
18.09.1989	Namabangasa	Mponda, prop.	0.013	
22.09.1987	"	Mponda, hydram	0.042	6.72
03.12.1987	"	" site	0.036	
28.01.1988	"	"	0.075	
03.08.1988	"	"	0.030	
11.08.1980	Mwambazi	Mponda Rd. brdg	0.100	22.1
13.08.1980	"	"	0.117	
15.08.1980	"	"	0.115	

Assuming the same probability distribution as at Kanantumbi river, the design flows has been estimated as shown in Table 3.15.

Table 3.15 Estimated low flows for the proposed water intake in the Namabangasa river.

	Return Interval, years				Mean
	2	5	10	20	
Flow, l/sec	17,7	13,0 12,6*	11,8 11,6*	10,6 10,7*	19

*) derived from rainfall probability analyses

3.6.9 Mwambazi River

The Mwambazi River originates in the rainforest, which covers approximately 50% of the total catchment of 4,05 km².

The river consists of two branches which have been measured quite a few times each, besides that the total flow has been measured just downstream of the confluence, close to the recently established Forest Nursery. All measurements are shown in Table 3.16.

Table 3.16 Spot discharge measurements in Mwambazi River.

Day/Month/ Year	River	Place	m ³ /sec
29.01.1988	Mwambazi River (West branch)	Mbizi Forest Nursery	0.014
06.04.1988	"	"	0.020
03.08.1988	"	"	0.010
30.05.1989	"	"	0.016
29.01.1988	Mwambazi River (East branch)	"	0.014
06.04.1988	"	"	0.018
03.08.1988	"	"	0.008
30.05.1989	"	"	0.024
08.12.1987	Mwambazi R.	Mbizi Forest (total flow)	0.015
17.10.1988	"	"	0.013
04.11.1988	"	"	0.008
18.09.1989	"	"	0.013
01.08.1989	"	" (d/s bridge)	0.060

The flow regime of the catchment is assumed to be very similar to the Kanantumbi River, except for a slightly higher specific yield in the first one, and transposing the data from the Kanantumbi river gives the 5, 10, and 20 years low flow of respectively 8.0, 7.3, and 6.6 l/sec, with an average low flow of 12 l/sec. Application of the simple rainfall statistics method from the WMP gives respectively 7.8, 7.1, and 6.6 l/sec.

3.6.10 Ponda River

The Ponda River is draining a very small catchment in the southern Mbizi Forest area. More than 90% of the drainage area to the existing water intake is covered by rainforest, indicating a rather stable low flow. Unfortunately, very few discharge measurements are available, as shown in Table 3.17.

Table 3.17 Spot discharge measurements at the existing water intake in Ponda River.

Day/Month/ Year	River	Place	m ³ /sec
03.07.1981	Ponda River	Mbizi Forest	8
14.09.1981	"	"	14
05.05.1982	"	"	25
19.05.1982	"	"	152
26.07.1982	"	"	4
01.08.1989	"	"	10
12.09.1989	"	Exist. int.	4
12.09.1989	"	d/s of tributaries	8

One of the two measurements from 1981 is evidently wrong, since the flow would most unlikely rise from 8 l/sec to 14 l/sec during the dry season.

The two single measurements from May 1982 are useless, since they have been carried out in or close to the end of the rainy season. Considering the rainfall of those particular years, the observations in July 1981 and July 1982 seem reasonable. Trying to extrapolate those values to the end of the dry season, by considering general flow recession characteristics of the area, indicate a very low flow in October, however. Most likely the flow may drop to less than 1 l/sec during an average year. It is recommended, however, to make a few observations during the next dry season.

3.6.11 Chanji River

The Chanji River, which drains an area of 8.05 km, was identified as a possible water source quite recently. The runoff has only been measured three times, and only one measurement indicate the low flow (table 3.19).

Table 3.19 Spot discharge measurements at the proposed water intake in Chanji river.

Day/Month/ Year	River	Place	m ³ /sec	Catchm. area km ²
28.01.1988	Chanji	Kingombe	0.045	8.05
06.04.1988	"	"	0.041	
25.10.1988	"	"	0.006	
05.09.1989	"	"	0.016	

The catchment characteristics are very similar to the Momoka river, however and based on the assumption that the same flow regime applies to the Chanji river, the estimated design flows may be transposed to the latter river. The flow observation in late October 1988 of 6 l/sec indicate a lower specific yield compared to the Momoka river, however. Considering the areal rainfall distribution, the decrease in yield is reasonable. This explanation is confirmed by the observations at Ndua River, and earlier observations in the Luiche River at Katumba.

Estimated 5,10 and 20 years low flows are respectively

3.6, 3, and 2.7 l/sec, based on the data from Muva and Momoka rivers, while using rainfall probability analyses give the comparable values of 5.8, 5.3 and 4.9 l/sec. For a preliminary evaluation of the water source the average of the values should be used, as given in Table 3.18.

Table 3.18. Estimated 5,10 and 20 years low flow at the proposed water intake in the Chanji River

	Return interval, years		
	5	10	20
Flow, l/sec.	4,7	4,2	3,8

Considering the scattering of the estimates, low flow observations should be carried out during the next dry season.

3.6.12 Malangali rivers

Due to the difficult water supply situation in Sumbawanga, some smaller rivers which might serve the Malangali Village on the outskirts of Sumbawanga were investigated during October 1988. The rivers are marked on the following mapsheet as southern, middle, and northern branch, and the results of the investigations are given in table 3.20.

Table 3.20

Day/Month/ Year	River	Place	m ³ /sec	Catchm. area km ²
29.10.1988	Middle branch	Malangali	1.1	1.99
"	Southern branch	"	1.6	1.69
"	Northern branch	"	0.5	-

The lower part of the northern branch dried up before the village, due to clutivation and some small scale irrigation.

NAMANYERE AREA

The only reliable sources for gravity water supply to Namanyere are located to the mountainous area in the south-southwest, (Figure 1), where three tributaries to the Nkulugusu River have been investigated. In addition, the Kachaswa River has been considered.

All spot discharge measurements carried out in the area are shown in Table 1.

Table 1. Discharge measurements in the Namanyere Area.

River/Location	Date/Year	l/sec	Remarks
Namteketa R.	19.07.82	2.9	u/s. of alternative intake
"	19.07.82	4.4	d/s. of river confluence
Nankala R.	19.07.82	1.8	At proposed intake
Kitete R.	12.08.87	27.0	
	11.09.87	18.0	
	09.10.87	14.0	
	14.11.87	12.0	
	11.12.87	25.0	
	14.01.88	99.0	
	21.06.88	51.0	
	18.08.88	23.0	
	08.10.88	6.0	
	16.10.88	7.0	
	29.06.89	49.0	
	13.09.89	9.9	

As seen from the table, the yield of the two tributaries Namteketa and Nankala is below the future water demand to the Namanyere Town.

During 1987 another tributary to the Nkulugusu River, the Kitete River was identified, and minor investigations have later been carried out.

By means of rainfall statistics, the low flow of various return intervals has been estimated as shown in Table 2.

Table 2. Low flow of the Kitete River, l/sec

River	Mean	Return intervals, years			
		2	5	10	20
Kitete R.	9.6	8.7	8.2	7.6	7.2

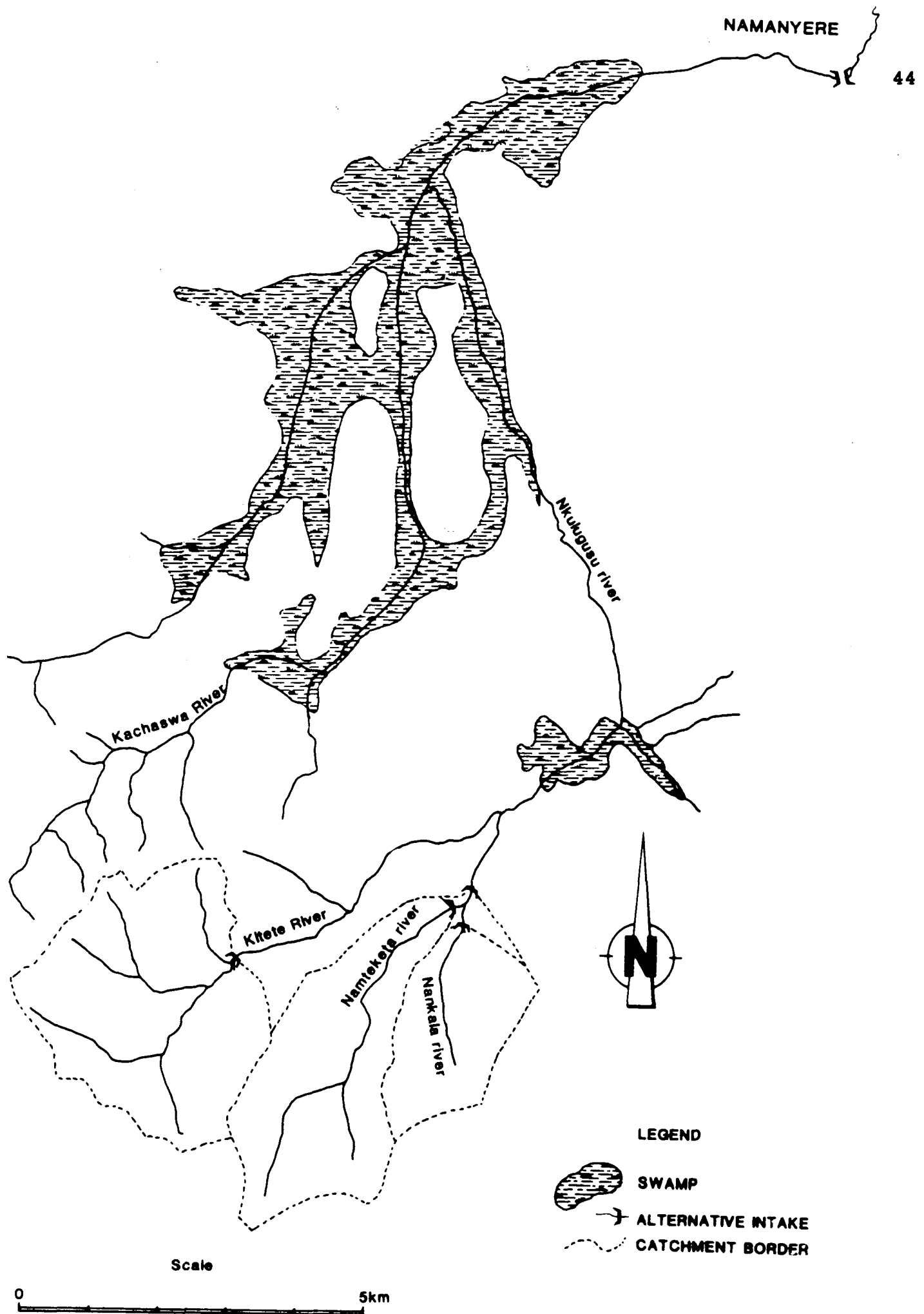


Figure 1. Alternative Water Sources to Namanyere WSS.

MPANDA AREA

The water demand to Mpanda Urban WS is estimated to 60 l/sec (information from RWE's Office). Numerous discharge measurements in the Mpanda Area have shown that sufficient quantities of water are available, as shown in Table 1.

Table 1. Discharge measurements in the Mpanda Area

River/Place	Date/year	l/sec	Remarks
Manga Juu. (Kanoge)	22.09.86	22.0	Prop. intake
	09.04.87	44.0	
	23.06.87	50.4	
	24.08.87	24.0	
	14.10.88	34.0	
	29.08.89	25.0	
	16.09.89	23.0	
	29.08.89	634.0	Milala Dam, outlet
Ikolongongo	25.08.87	128	Lower Section
	01.10.87	114	
	31.10.87	122	
	03.11.87	94	
	28.11.87	90	
	22.12.87	125	
	16.02.88	143	
	13.04.88	125	
	28.05.88	135	
	08.07.88	129	
	08.09.88	119	
	16.10.88	104	
	07.12.88	113	
	02.03.89	188	
	23.06.89	159	
	29.08.89	108	Middle Section
	14.09.89	111	
	28.05.88	123	
	08.07.88	110	
	08.09.88	99	
	02.12.88	82	
	02.03.89	161	Upper Section
	23.06.89	122	
	29.08.89	96	
	03.11.87	66	
	28.05.88	112	
	08.07.88	103	
	11.08.88	102	Upper Spring
	08.09.88	84	
	14.10.88	68	
	02.12.88	60	
	02.03.89	113	
	29.08.89	106	
	14.09.89	87	
	29.08.89	65	

based on long historical rainfall records and rainfall statistics, the design flow has been estimated as shown in Table 2.

Table 2. Low flow, Mpanda Area

River	Return interval, years				
	Mean	2	5	10	20
Ikolongo u/s	72	66	61	56	53
Ikolongo d/s	92	83	77	72	67
Manga Juu/Kanoge	19	17	16	15	14

The results of the low flow measurements are a bit ambiguous, and the values in Table 2 are probably underestimated. For a safe water yield, however, the values in Table 2 should be used for design purposes.

APPENDIX 1

Daily Discharges

RATING CURVE

Station: **USIA VILLAGE**

Period no. 1: **24.05.1975 - T.D.**

$$Q = 9.7766 * (H - 0.24) ** 2.8383$$

$$H_{min} = 0.24$$

STATION: USIA VILLAGE
 MAIN RIVER: LUICHE
 RIVER: LUICHE

DAILY MEANS (M³/S)

DATE: 88/11/24.
 YEAR: 1975

CATCHMENT AREA: 625. KM2

DATO	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DES
1	-	-	-	-	-	1.079	.726	.538	.352	.214	.133	.264
2	-	-	-	-	-	1.079	.726	.538	.352	.191	.133	.191
3	-	-	-	-	-	1.079	.726	.497	.321	.191	.133	.151
4	-	-	-	-	-	1.014	.726	.497	.321	.191	.133	1.446
5	-	-	-	-	-	1.014	.726	.497	.321	.170	.133	.457
6	-	-	-	-	-	.951	.675	.457	.321	.191	.133	.352
7	-	-	-	-	-	.951	.675	.457	.321	.191	.133	.321
8	-	-	-	-	-	.951	.675	.457	.321	.170	.133	.385
9	-	-	-	-	-	.951	.627	.457	.321	.170	.101	.352
10	-	-	-	-	-	.951	.627	.457	.321	.170	.101	.582
11	-	-	-	-	-	.951	.627	.457	.321	.170	.101	.352
12	-	-	-	-	-	.951	.627	.457	.321	.170	.133	1.613
13	-	-	-	-	-	.951	.627	.457	.291	.151	.191	.497
14	-	-	-	-	-	.951	.627	.420	.291	.151	.214	.726
15	-	-	-	-	-	.951	.627	.420	.264	.151	.170	.726
16	-	-	-	-	-	1.079	.627	.420	.264	.151	.170	.833
17	-	-	-	-	-	1.014	.627	.420	.264	.151	.538	.675
18	-	-	-	-	-	1.014	.627	.420	.264	.151	.291	.891
19	-	-	-	-	-	.951	.627	.420	.264	.151	.214	1.291
20	-	-	-	-	-	.951	.582	.420	.264	.170	.214	1.079
21	-	-	-	-	-	.951	.582	.420	.264	.214	.214	.951
22	-	-	-	-	-	.951	.582	.420	.264	.264	.191	2.083
23	-	-	-	-	-	.891	.582	.385	.264	.291	.170	1.217
24	-	-	-	-	1.217	.833	.582	.385	.264	.214	.170	1.014
25	-	-	-	-	1.217	.833	.582	.385	.264	.191	.133	1.613
26	-	-	-	-	1.217	.778	.538	.385	.238	.170	.133	1.014
27	-	-	-	-	1.217	.778	.538	.385	.238	.170	.133	1.014
28	-	-	-	-	1.147	.778	.538	.385	.238	.170	.117	.833
29	-	-	-	-	1.079	.778	.538	.385	.214	.151	.101	.726
30	-	-	-	-	1.079	.726	.538	.385	.214	.133	.321	1.217
31	-	-	-	-	1.079		.538	.385		.133		.726
MIDDEL	-	-	-	-	-	.936	.621	.434	.284	.177	.172	.825
MAX	-	-	-	-	-	1.079	.726	.538	.352	.291	.538	2.083

DAILY MEANS (M³/S)

STATION: USIA VILLAGE
 MAIN RIVER: LUICHE
 RIVER: LUICHE

DATE: 88/11/24.
 YEAR: 1976

CATCHMENT AREA: 625. KM2

DATO	JAN	FEB	MAR	APR	MAI	JUN	JUL	AUG	SEP	OKT	NOV	DES
1	2.517	.891	1.291	2.404	2.294	1.367	.627	.385	.321	.101	.075	.191
2	3.698	.833	1.291	2.404	2.187	1.367	.627	.385	.291	.101	.064	.170
3	1.983	2.294	1.528	2.294	2.187	1.367	.627	.385	.291	.101	.064	.385
4	1.528	1.291	1.291	3.552	2.083	1.367	.627	.385	.264	.117	.003	.291
5	1.792	1.446	1.079	4.002	2.083	1.367	.627	.385	.264	.101	.003	.191
6	1.446	1.217	3.552	3.848	2.083	1.217	.627	.385	.264	.101	.003	.214
7	1.446	1.079	1.147	2.879	2.083	1.217	.582	.385	.264	.101	.003	.214
8	1.886	1.367	1.014	3.006	2.517	1.147	.582	.385	.264	.101	.014	.420
9	2.517	1.147	1.291	3.137	2.294	1.079	.538	.385	.264	.133	.011	.321
10	2.294	1.014	1.079	3.698	2.083	1.079	.538	.385	.264	.133	.014	.238
11	1.701	.891	1.147	5.960	1.886	1.079	.538	.352	.264	.133	.133	.214
12	1.446	.833	1.367	7.716	1.792	1.079	.538	.352	.238	.088	.133	.191
13	1.367	1.079	2.879	7.481	1.528	1.014	.538	.352	.238	.101	.088	.170
14	2.083	1.613	2.404	6.585	1.528	.951	.538	.352	.264	.075	.170	.151
15	1.701	1.613	2.187	5.376	1.528	.951	.538	.321	.264	.075	.170	.133
16	1.446	3.272	1.886	5.008	1.446	.951	.538	.321	.238	.075	.170	.133
17	1.367	1.792	1.886	4.830	1.367	.951	.538	.352	.238	.101	.170	.133
18	1.217	1.792	2.187	4.830	1.446	.891	.497	.352	.264	.170	.133	.133
19	1.147	1.528	2.294	5.960	1.367	.891	.497	.321	.264	.214	.088	.133
20	1.079	2.755	2.294	5.008	1.367	.833	.497	.321	.238	.151	.075	.117
21	1.014	2.634	2.083	4.486	1.886	.833	.497	.321	.238	.133	.238	.117
22	.891	2.294	1.792	3.848	2.294	.726	.497	.321	.214	.101	.385	.264
23	.778	1.792	1.613	3.410	2.294	.726	.457	.321	.214	.101	.264	.352
24	.726	1.613	1.613	3.137	1.983	.726	.457	.291	.191	.101	.264	.291
25	.726	1.528	1.701	3.006	1.886	.726	.457	.291	.170	.101	.191	.214
26	.675	1.367	2.294	3.137	1.792	.726	.457	.264	.170	.101	1.613	.291
27	.778	1.291	2.755	3.006	1.792	.726	.457	.264	.133	.101	.385	.214
28	1.367	1.079	2.755	3.006	1.792	.675	.457	.264	.133	.075	.321	.497
29	1.147	1.147	2.755	2.755	1.528	.675	.457	.264	.133	.075	.214	.420
30	1.147		2.755	2.517	1.528	.675	.420	.321	.133	.075	.214	.420
31	1.079		2.755		1.446		.420	.321		.075		.538
MIDDEL	1.483	1.548	1.934	4.076	1.850	.979	.525	.338	.233	.106	.189	.250
MAX	3.698	3.272	3.552	7.716	2.517	1.367	.627	.385	.321	.214	1.613	.538

STATION: USIA VILLAGE
MAIN RIVER: LUICHE
RIVER: LUICHE

CATCHMENT AREA: 625. KM2

DATO	JAN	FEB	MAR	APR	MAI	JUN	JUL	AUG	SEP	OKT	NOV	DES
1	.21	2.29	2.88	1.08	1.89	1.22	.73	.46	.32	.21	.13	.26
2	.63	2.19	2.63	1.08	1.98	1.22	.68	.46	.32	.21	.13	.26
3	.95	1.89	2.76	1.53	1.98	1.08	.68	.46	.32	.21	.13	1.15
4	.95	1.79	2.52	1.37	3.85	1.08	.63	.46	.32	.21	.13	.95
5	.46	1.89	2.52	1.29	5.38	1.08	.63	.46	.32	.21	.21	.68
6	.32	1.79	1.98	11.85	6.80	1.08	.63	.46	.32	.21	.21	.46
7	.32	1.70	1.70	3.01	7.02	1.01	.54	.46	.32	.19	.21	2.40
8	.32	1.53	2.52	3.14	5.76	.95	.54	.46	.32	.17	.21	1.98
9	.26	1.70	1.70	4.32	4.83	.95	.54	.46	.32	.13	.21	1.53
10	.26	4.16	1.79	4.49	4.66	1.01	.54	.42	.32	.13	1.22	.68
11	.46	2.40	1.53	4.32	4.16	.95	.46	.42	.32	.13	.95	.54
12	.32	3.01	4.49	4.16	3.41	.95	.54	.39	.32	.13	.42	.46
13	.46	2.52	3.27	3.85	2.88	.95	.54	.39	.32	.13	.21	.39
14	.32	2.08	3.14	3.55	2.40	.95	.54	.39	.32	.13	.17	.32
15	.32	1.98	2.88	3.27	2.29	.95	.54	.39	.32	.13	.21	.42
16	.32	1.89	2.63	2.63	2.08	.89	.54	.50	.32	.13	.63	.32
17	.58	1.79	2.08	2.52	1.89	.83	.54	.39	.32	.13	.50	.26
18	.50	1.70	2.08	2.29	1.70	.83	.46	.39	.32	.13	.29	.50
19	1.37	1.53	6.59	2.40	1.53	.83	.46	.39	.32	.13	.89	.39
20	1.53	1.37	2.63	2.88	1.53	.83	.54	.35	.32	.13	.39	.32
21	.83	1.37	2.29	2.63	1.53	.83	.54	.32	.32	.13	.32	.32
22	2.88	4.00	2.08	2.63	1.37	.78	.54	.32	.32	.13	.32	.39
23	2.76	3.27	2.08	2.29	1.37	.78	.46	.32	.26	.13	.32	.42
24	2.08	2.29	2.40	2.19	1.22	.73	.46	.32	.21	.13	.42	.78
25	2.08	2.52	2.08	1.98	1.22	.73	.46	.32	.32	.13	.32	.58
26	2.63	2.40	1.79	1.89	1.22	.73	.46	.32	.21	.15	.29	.54
27	2.40	2.88	1.61	1.70	1.15	.73	.46	.32	.21	.13	.39	1.70
28	2.29	4.16	1.45	1.70	1.15	.73	.46	.32	.21	.13	.35	1.89
29	2.29		1.37	1.61	1.15	.73	.46	.32	.21	.13	.46	1.37
30	1.98		1.22	1.79	1.22	.73	.46	.32	.21	.13	.46	1.22
31	2.40		1.15		1.22		.46	.32		.13		1.15
MIDDEL	1.15	2.29	2.38	2.85	2.64	.90	.53	.39	.30	.15	.37	.79
MAX	2.88	4.16	6.59	11.85	7.02	1.22	.73	.50	.32	.21	1.22	2.40
MIN	.21	.26	.26	.32	.46	.54	.63	.68	.73	.89	.95	1.15

DAILY MEANS (M³/S)

STATION: USIA VILLAGE
 MAIN RIVER: LUICHE
 RIVER: LUICHE

DATE: 88/11/24.
 YEAR: 1978

CATCHMENT AREA: 625. KM2

DATO	JAN	FEB	MAR	APR	MAI	JUN	JUL	AUG	SEP	OKT	NOV	DES
1	1.08	1.15	7.48	7.48	3.01	1.70	1.15	.73	.46	.26	1.08	.68
2	1.08	1.98	5.19	5.96	2.88	1.70	1.08	.73	.46	.26	.39	.54
3	.95	1.61	5.38	6.80	2.76	1.70	1.08	.73	.46	.29	.26	.89
4	1.01	1.37	4.66	5.96	2.63	1.70	1.08	.73	.46	.29	.26	.89
5	.89	1.22	4.00	5.57	2.52	1.70	1.08	.73	.46	.26	.26	.58
6	.68	1.08	3.70	5.38	2.52	1.70	1.08	.73	.46	.26	.26	.58
7	.89	1.08	3.70	4.49	2.76	1.70	1.08	.73	.42	.26	.21	.73
8	.89	1.08	3.27	4.32	2.52	1.70	1.08	.68	.39	.26	.19	.63
9	.68	1.29	3.01	4.16	2.52	1.61	1.08	.68	.39	.26	.17	.54
10	.54	1.53	2.76	4.16	2.52	1.53	1.08	.63	.39	.26	.17	.63
11	.63	1.61	5.38	4.16	2.29	1.53	1.08	.63	.39	.26	.13	.58
12	.54	1.53	4.83	4.16	2.29	1.53	1.08	.63	.39	.26	.13	.58
13	.46	2.52	4.16	4.00	2.29	1.53	1.01	.63	.39	.24	.13	.73
14	.54	2.29	3.85	3.85	2.19	1.53	.95	.63	.39	.24	.13	.95
15	.78	1.98	4.49	3.70	2.08	1.53	.95	.63	.39	.21	.13	.89
16	.95	1.98	4.16	3.55	2.08	1.53	.95	.63	.39	.21	3.55	.95
17	.83	1.98	5.19	3.41	2.08	1.45	.95	.58	.35	.21	1.53	1.08
18	.73	1.79	5.19	3.27	2.08	1.45	.95	.58	.32	.21	.95	.89
19	.68	1.70	5.19	3.14	2.08	1.37	.95	.54	.32	.21	.63	1.01
20	.54	2.88	5.76	3.01	1.89	1.37	.95	.54	.32	.21	1.70	.89
21	.89	2.52	5.96	2.88	1.89	1.37	.95	.54	.32	.17	1.53	.73
22	.73	2.40	5.76	2.76	1.89	1.37	.89	.54	.29	.17	1.70	.63
23	.63	2.29	5.57	2.88	1.89	1.37	.83	.54	.26	.17	1.70	.83
24	.95	2.76	5.76	2.76	1.79	1.37	.83	.54	.26	.17	1.22	.73
25	.89	8.71	5.96	3.41	1.70	1.22	.83	.54	.26	.17	.68	.83
26	.73	30.32	6.37	3.14	1.70	1.22	.83	.50	.26	.26	.54	1.08
27	1.01	11.54	5.96	2.76	1.70	1.22	.83	.46	.26	.26	1.37	1.45
28	.95	8.20	6.80	2.76	1.70	1.22	.83	.46	.26	.26	1.29	1.22
29	.95		6.37	3.27	1.70	1.22	.83	.46	.26	.26	1.08	1.29
30	.83		5.96	3.01	1.70	1.22	.83	.46	.26	.26	.83	1.29
31	.89		5.57		1.70		.83	.46		.21		1.29
MIDDEL	.80	3.66	5.08	4.00	2.17	1.48	.97	.60	.36	.24	.81	.86
MAX	1.08	30.32	7.48	7.48	3.01	1.70	1.15	.73	.46	.29	3.55	1.45

STATION: USIA VILLAGE
 MAIN RIVER: LUICHE
 RIVER: LUICHE

DAILY MEANS (M³/S)

DATE: 88/11/24.
 YEAR: 1979

CATCHMENT AREA: 625. KM2

DATO	JAN	FEB	MAR	APR	MAI	JUN	JUL	AUG	SEP	OKT	NOV	DES
1	1.45	4.66	4.32	3.55	8.45	3.14	2.76	1.45	1.01	.58	.26	.68
2	1.29	5.19	4.32	3.55	7.02	3.14	2.76	1.45	1.01	.58	.26	.63
3	1.08	4.49	4.16	3.55	6.59	3.01	2.63	1.45	1.01	.58	.26	.63
4	.89	4.16	4.32	3.55	6.37	3.01	2.63	1.45	1.01	.54	.24	.68
5	.68	4.00	3.85	3.55	6.16	3.01	2.52	1.37	1.01	.54	.24	.73
6	.78	3.55	3.55	3.55	5.57	3.01	2.52	1.37	1.01	.54	.24	.78
7	.58	3.41	4.16	3.41	5.57	2.88	2.52	1.37	.95	.54	.24	.83
8	1.70	3.14	3.85	3.41	5.96	2.88	2.40	1.37	.95	.50	.24	.83
9	2.29	3.85	4.16	9.78	5.76	2.88	2.40	1.37	.89	.50	.21	.95
10	2.08	4.49	4.16	7.72	5.38	2.76	2.29	1.37	.83	.50	.21	1.01
11	1.45	4.00	4.16	8.20	5.19	2.76	2.29	1.29	.83	.50	.21	1.01
12	1.29	4.00	3.70	7.48	5.01	2.76	2.29	1.29	.83	.46	.24	.95
13	1.22	3.41	3.55	5.57	4.83	2.88	2.19	1.29	.78	.46	.24	1.08
14	1.08	4.16	4.16	5.96	4.83	3.14	2.19	1.29	.78	.46	.24	1.15
15	1.08	4.16	3.85	6.59	4.66	3.14	2.08	1.29	.78	.42	.21	1.22
16	1.08	3.85	5.76	7.48	4.66	3.27	2.08	1.29	.78	.42	.19	1.29
17	.95	3.41	7.02	7.48	4.66	3.27	1.98	1.22	.73	.39	.19	1.29
18	.95	4.00	6.80	10.34	4.16	3.27	1.89	1.22	.73	.39	.21	1.45
19	.95	3.85	4.83	8.45	4.16	3.14	1.89	1.22	.73	.39	.24	1.45
20	.95	3.70	5.19	8.71	4.16	3.14	1.89	1.22	.68	.35	.24	1.45
21	.89	4.16	5.01	7.02	4.16	3.14	1.89	1.22	.68	.35	.24	1.37
22	.95	3.85	4.83	9.23	4.00	3.01	1.79	1.15	.68	.35	.29	1.37
23	.95	3.85	4.66	8.20	4.00	3.01	1.79	1.15	.68	.32	.35	1.70
24	1.37	5.19	4.49	7.25	3.85	3.01	1.79	1.15	.63	.32	.39	1.79
25	1.08	4.16	4.32	7.25	3.85	3.01	1.70	1.15	.63	.32	.39	1.79
26	1.45	4.00	4.32	6.80	3.70	3.01	1.70	1.15	.63	.32	.54	1.70
27	1.29	3.85	4.16	6.59	3.55	2.88	1.61	1.08	.63	.29	.54	1.61
28	2.40	4.00	3.85	6.80	3.55	2.88	1.53	1.08	.63	.29	.54	1.61
29	2.08		3.85	5.96	3.41	2.88	1.53	1.08	.58	.29	.63	1.53
30	2.19		3.70	6.59	3.41	2.88	1.53	1.08	.58	.26	.68	1.61
31	5.01		3.55		3.27		1.53	1.01		.26		1.61
MIDDEL	1.40	4.02	4.41	6.45	4.83	3.00	2.08	1.25	.79	.42	.31	1.22
MAX	5.01	5.19	7.02	10.34	8.45	3.27	2.76	1.45	1.01	.58	.68	1.79

DAILY MEANS (M³/S)

STATION: USIA VILLAGE
 MAIN RIVER: LUICHE
 RIVER: LUICHE

DATE: 88/11/24.
 YEAR: 1980

CATCHMENT AREA: 625. KM2

DATO	JAN	FEB	MAR	APR	MAI	JUN	JUL	AUG	SEP	OKT	NOV	DES
1	1.61	3.14	1.98	2.52	11.23	2.19	1.70	1.22	.73	.50	.39	.50
2	1.61	3.01	2.08	2.52	12.49	2.19	1.70	1.22	.73	.50	.39	.46
3	1.70	3.01	2.08	2.63	12.81	2.19	1.70	1.22	.73	.50	.39	.46
4	1.79	2.88	2.40	2.63	13.49	2.08	1.61	1.15	.73	.50	.39	.46
5	1.79	2.88	2.40	2.76	14.54	2.08	1.61	1.15	.73	.50	.39	.54
6	1.89	2.76	3.55	2.88	11.54	2.08	1.61	1.15	.68	.50	.39	2.29
7	1.89	2.76	3.70	2.88	11.23	2.08	1.61	1.15	.68	.46	.39	2.29
8	1.98	2.63	3.41	2.88	7.96	1.98	1.61	1.08	.63	.46	.35	2.29
9	2.08	2.63	3.14	3.01	7.48	1.98	1.61	1.08	.63	.42	.35	2.29
10	2.08	2.63	3.27	3.14	7.25	1.98	1.53	1.08	.63	.39	.32	2.29
11	2.19	2.52	3.14	3.14	6.80	1.98	1.53	1.01	.63	.39	.32	2.29
12	2.29	2.40	5.96	3.01	7.25	1.98	1.53	1.01	.63	.39	.32	2.29
13	2.29	2.29	5.96	3.01	6.59	1.89	1.53	1.01	.63	.39	.32	2.40
14	2.40	2.08	7.48	2.88	6.37	1.89	1.53	.95	.63	.39	.29	2.19
15	2.40	1.98	10.63	2.88	5.96	1.89	1.53	.95	.63	.42	.29	2.08
16	2.63	2.88	8.97	2.88	4.49	1.89	1.45	.95	.63	.39	.29	1.98
17	2.63	1.89	6.16	2.88	4.16	1.89	1.45	.95	.63	.39	.26	1.61
18	2.76	1.70	5.96	2.88	4.00	1.89	1.37	.95	.63	.42	.26	1.37
19	2.88	1.70	5.76	4.16	4.00	1.79	1.37	.89	.63	.42	.73	1.22
20	2.88	1.61	4.16	4.16	3.85	1.79	1.37	.89	.58	.95	.73	1.08
21	3.01	1.53	3.70	5.19	3.70	1.79	1.22	.89	.58	.95	.73	1.08
22	3.01	1.53	3.55	5.57	3.55	1.79	1.22	.89	.58	.83	.68	1.53
23	3.14	1.79	3.55	5.96	3.27	1.79	1.22	.89	.54	.78	.68	1.22
24	3.14	1.53	3.41	6.59	3.14	1.79	1.22	.83	.54	.73	.63	1.89
25	3.27	1.45	3.01	7.02	3.01	1.79	1.22	.83	.54	.73	.63	1.98
26	3.41	1.45	2.88	7.02	3.01	1.70	1.22	.78	.54	.68	.63	2.63
27	3.41	2.08	2.76	7.72	2.76	1.70	1.22	.78	.54	.63	.63	2.29
28	3.41	2.08	2.76	7.96	2.40	1.70	1.22	.73	.54	.58	.58	2.52
29	3.27	1.89	2.63	10.63	2.29	1.70	1.22	.73	.54	.50	.54	3.41
30	3.14		2.52	10.63	2.29	1.70	1.22	.73	.54	.46	.54	4.16
31	3.14		2.52		2.19		1.22	.73		.39		4.16
MIDDEL	2.55	2.24	4.05	4.47	6.29	1.91	1.43	.96	.62	.53	.46	1.91
MAX	3.41	3.14	10.63	10.63	14.54	2.19	1.70	1.22	.73	.95	.73	4.16

DAILY MEANS (M³/S)

STATION: USIA VILLAGE
 MAIN RIVER: LUICHE
 RIVER: LUICHE

DATE: 88/11/24.
 YEAR: 1981

CATCHMENT AREA: 625. KM2

DATO	JAN	FEB	MAR	APR	MAI	JUN	JUL	AUG	SEP	OKT	NOV	DES
1	2.52	4.16	2.52	42.63	-	-	-	-	-	-	-	-
2	2.40	4.16	3.85	42.63	-	-	-	-	-	-	-	-
3	2.19	4.66	3.70	24.39	-	-	-	-	-	-	-	-
4	2.08	4.32	3.55	16.40	-	-	-	-	-	-	-	-
5	2.08	3.27	3.41	16.02	-	-	-	-	-	-	-	-
6	2.08	3.41	3.41	16.02	-	-	-	-	-	-	-	-
7	2.76	3.85	3.27	12.49	-	-	-	-	-	-	-	-
8	2.52	4.49	3.27	9.78	-	-	-	-	-	-	-	-
9	2.40	4.83	3.55	16.40	-	-	-	-	-	-	-	-
10	2.40	4.66	3.85	13.49	-	-	-	-	-	-	-	-
11	2.76	4.32	3.70	34.54	-	-	-	-	-	-	-	-
12	2.52	4.00	3.55	13.83	-	-	-	-	-	-	-	-
13	2.19	3.85	3.27	9.78	-	-	-	-	-	-	-	-
14	1.98	3.70	3.01	8.45	-	-	-	-	-	-	-	-
15	1.89	3.55	2.88	8.20	-	-	-	-	-	-	-	-
16	1.98	3.55	2.88	7.72	-	-	-	-	-	-	-	-
17	1.61	4.16	2.76	7.72	-	-	-	-	-	-	-	-
18	1.37	4.66	2.63	7.48	-	-	-	-	-	-	-	-
19	1.22	4.83	2.52	6.37	-	-	-	-	-	-	-	-
20	1.08	4.49	3.41	5.96	-	-	-	-	-	-	-	-
21	1.08	4.32	3.14	5.19	-	-	-	-	-	-	-	-
22	1.53	3.27	3.27	5.19	-	-	-	-	-	-	-	-
23	1.22	3.41	3.27	5.01	-	-	-	-	-	-	-	-
24	1.89	3.55	3.27	4.83	-	-	-	-	-	-	-	-
25	1.98	3.55	4.32	4.49	-	-	-	-	-	-	-	-
26	2.63	4.16	4.83	4.32	-	-	-	-	-	-	-	-
27	2.29	4.16	7.25	4.32	-	-	-	-	-	-	-	-
28	2.52	4.00	8.71	4.32	-	-	-	-	-	-	-	-
29	3.41		7.72	4.32	-	-	-	-	-	-	-	-
30	4.16		7.72	4.32	-	-	-	-	-	-	-	-
31	4.16		42.63		-	-	-	-	-	-	-	-
MIDDEL	2.22	4.05	5.20	12.22	-	-	-	-	-	-	-	-
MAX	4.16	4.83	42.63	42.63	-	-	-	-	-	-	-	-

STATION: USIA VILLAGE
 MAIN RIVER: LUICHE
 RIVER: LUICHE

DAILY MEANS (M³/S)

DATE: 88/11/24.
 YEAR: 1982

CATCHMENT AREA: 625. KM2

DATO	JAN	FEB	MAR	APR	MAI	JUN	JUL	AUG	SEP	OKT	NOV	DES
1	4.32	4.32	4.83	4.83	3.41	1.45	.89	.54	.26	.05	.54	4.32
2	4.49	4.32	4.49	4.49	-	1.45	.83	.54	.26	.05	.83	5.38
3	4.32	4.32	4.49	4.49	2.76	1.37	.83	.50	.26	.04	.83	7.02
4	-	4.49	4.49	4.32	2.63	1.45	.83	.50	.26	.04	.26	7.48
5	4.49	5.19	4.49	4.32	-	1.37	.78	.50	.24	.04	.24	6.37
6	-	5.01	4.49	4.49	-	1.37	.78	.50	.21	.04	.17	4.16
7	-	4.83	4.49	5.19	2.63	1.29	.78	.46	.21	.02	.15	4.00
8	-	4.66	12.16	4.83	2.52	1.29	.73	.46	.21	.02	.13	4.66
9	-	5.19	14.18	5.01	2.29	1.22	.73	.42	.21	.014	.12	3.55
10	-	5.19	13.15	4.83	2.29	1.22	.73	.42	.19	.01	.10	3.85
11	-	5.01	10.63	4.83	2.40	1.22	.73	.46	.19	.01	.10	4.32
12	-	5.57	8.45	5.01	2.40	1.15	.73	.46	.19	.01	.17	8.45
13	-	5.38	7.02	4.49	2.40	1.15	.73	.46	.15	.01	.35	8.20
14	-	5.19	5.19	4.32	2.63	1.15	.73	.42	.13	.01	.29	7.72
15	-	5.19	5.19	4.32	3.27	1.08	.68	.39	.13	.01	.26	7.25
16	-	4.83	4.32	-	3.27	1.08	.68	.39	.13	.01	.54	8.71
17	-	4.83	3.85	-	3.01	1.08	.68	.39	.13	.01	.83	9.50
18	-	4.49	3.27	-	3.01	1.08	.68	.39	.13	.01	.78	10.93
19	-	4.49	3.01	-	2.40	1.08	.63	.39	.13	.01	.32	10.34
20	-	4.49	3.01	-	2.52	1.01	.63	.39	.13	.02	.46	10.06
21	-	4.66	3.01	-	2.29	1.01	.63	.35	.13	.02	.39	14.90
22	-	4.66	3.55	-	2.08	1.01	.63	.35	.12	.02	.35	8.71
23	-	4.83	4.00	-	1.98	1.01	.63	.32	.12	.05	.32	10.34
24	-	4.49	4.32	4.49	1.79	.95	.63	.32	.12	.08	.39	8.45
25	-	4.49	4.00	4.49	1.70	.95	.63	.32	.12	.08	.83	7.72
26	-	4.49	3.01	4.32	1.53	.95	.63	.32	.10	.13	2.29	6.37
27	-	4.49	3.14	4.32	1.45	.95	.58	.32	.08	.13	2.29	7.72
28	-	4.83	3.14	4.32	1.45	.95	.54	.32	.08	.21	2.52	8.20
29	-	-	3.14	4.32	1.37	.95	.54	.29	.05	.26	2.29	18.42
30	-	-	3.01	4.32	1.37	.95	.54	.29	.05	.26	3.55	11.23
31	-	-	2.52	-	1.37	-	.54	.29	-	.26	-	8.45
MIDDEL	-	4.78	5.23	-	-	1.14	.69	.40	.16	.06	.76	7.96
MAX	-	5.57	14.18	-	-	1.45	.89	.54	.26	.26	3.55	18.42

DAILY MEANS (M³/S)

STATION: USIA VILLAGE
 MAIN RIVER: LUICHE
 RIVER: LUICHE

DATE: 88/11/24.
 YEAR: 1983

CATCHMENT AREA: 625. KM2

DATO	JAN	FEB	MAR	APR	MAI	JUN	JUL	AUG	SEP	OKT	NOV	DES
1	8.20	21.96	5.96	4.66	3.27	2.08	1.29	.95	.63	.26	.39	.54
2	8.45	21.50	5.57	5.38	3.41	2.08	1.29	.95	.58	.26	.39	.54
3	8.71	18.42	5.57	9.23	3.27	2.08	1.29	.95	.54	.26	.32	.54
4	22.44	10.34	5.96	8.20	3.55	1.98	1.45	.95	.54	.26	.32	.50
5	27.52	7.72	5.57	8.20	3.55	1.98	1.22	.83	.54	.26	.26	.63
6	26.45	7.96	5.38	7.72	3.41	1.89	1.22	.83	.54	.24	.26	.73
7	25.93	7.96	5.19	4.49	3.14	1.89	1.22	.83	.50	.24	.26	.95
8	28.62	5.19	4.66	4.83	3.01	1.89	1.22	.63	.50	.24	.21	.95
9	29.18	5.19	4.49	4.49	3.27	1.70	1.22	1.08	.50	.24	.26	.83
10	30.90	4.66	4.83	4.16	3.01	1.70	1.22	1.08	.46	.21	.26	1.01
11	30.32	4.66	4.83	4.16	3.01	1.70	1.22	1.22	.46	.21	.26	1.15
12	28.07	4.49	5.19	3.85	3.01	1.70	1.15	1.37	.46	.17	.21	1.22
13	25.93	5.19	5.57	3.85	2.88	1.70	1.15	1.22	.46	.17	.17	1.37
14	24.39	7.48	5.57	3.55	2.88	1.70	1.15	1.08	.42	.17	.17	1.61
15	23.40	7.25	7.96	3.55	2.76	1.70	1.15	1.08	.42	.17	.17	1.70
16	21.96	7.72	7.48	3.55	2.63	1.70	1.15	1.08	.39	.39	.21	1.70
17	18.84	7.48	7.25	3.41	2.52	1.70	1.15	1.08	.39	.39	.21	1.61
18	18.00	7.25	7.48	3.27	2.52	1.61	1.08	1.08	.39	.39	.21	1.61
19	17.19	7.96	10.06	3.27	2.29	1.61	1.08	1.08	.35	.32	.17	2.19
20	16.79	7.96	8.71	3.55	2.29	1.53	1.08	1.08	.32	.32	.17	2.52
21	7.96	8.45	7.96	3.85	2.29	1.53	1.08	1.01	.32	.32	.13	2.52
22	21.50	7.96	6.16	3.85	2.19	1.53	1.01	.89	.32	.26	.13	4.16
23	22.44	7.72	5.57	3.85	2.19	1.53	1.01	.83	.32	.26	.13	4.16
24	17.59	7.25	5.19	3.85	2.19	1.53	.95	.73	.26	.46	.13	4.16
25	27.52	6.80	5.01	3.70	2.08	1.45	.95	.73	.26	.46	.24	3.85
26	25.41	6.59	5.19	3.55	2.08	1.45	.95	.73	.26	.42	.26	3.85
27	24.90	6.16	5.38	3.41	2.08	1.45	.95	.73	.26	.39	.39	3.85
28	24.39	6.37	5.01	3.55	2.08	1.37	.95	.73	.26	.39	.39	3.85
29	23.40		4.83	3.27	2.08	1.37	.95	.68	.26	.39	.54	3.70
30	23.40		4.49	3.27	2.08	1.37	.95	.63	.26	.39	.54	3.55
31	23.40		4.49		2.08		.95	.63		.39		3.14
MIDDEL	22.04	8.41	5.89	4.45	2.68	1.68	1.12	.93	.41	.30	.26	2.09
MAX	30.90	21.96	10.06	9.23	3.55	2.08	1.45	1.37	.63	.46	.54	4.16

STATION: USIA VILLAGE
 MAIN RIVER: LUICHE
 RIVER: LUICHE

DAILY MEANS (M³/S)

DATE: 88/11/24.
 YEAR: 1984

CATCHMENT AREA: 625. KM2

DATO	JAN	FEB	MAR	APR	MAI	JUN	JUL	AUG	SEP	OKT	NOV	DES
1	3.01	2.76	7.96	3.85	2.40	1.53	1.08	.78	.32	.04	.00	1.61
2	4.16	4.32	7.96	3.55	2.29	1.53	1.01	.78	.32	.04	.00	1.22
3	4.00	5.01	7.72	3.27	2.29	1.53	1.01	.73	.32	.04	.00	1.53
4	4.49	8.20	7.25	3.27	2.08	1.53	.95	.73	.32	.05	.00	1.70
5	4.66	7.72	6.37	3.14	2.08	1.53	.95	.73	.32	.05	.00	1.70
6	5.57	5.76	4.49	3.01	2.08	1.45	.95	.73	.32	.05	.00	1.79
7	7.02	5.57	4.83	3.01	1.98	1.45	.95	.68	.32	.26	.00	1.98
8	8.71	5.38	4.49	2.88	1.98	1.45	.89	.68	.29	.26	.00	2.08
9	8.20	5.19	4.16	2.76	1.89	1.37	.83	.68	.26	.26	.01	2.29
10	7.96	4.83	4.00	2.63	1.89	1.37	.83	.68	.26	.21	.05	2.29
11	7.48	4.49	3.55	2.52	1.89	1.37	.83	.68	.26	.21	.13	2.08
12	6.59	4.49	3.27	3.01	1.89	1.37	.83	.68	.12	.19	.15	2.52
13	5.96	4.49	3.55	4.00	1.89	1.37	.83	.63	.15	.17	.17	2.52
14	5.96	4.83	4.16	4.49	1.89	1.22	.83	.63	.13	.15	.21	2.52
15	5.96	5.19	7.72	4.49	1.89	1.22	.83	.63	.13	.13	.21	2.76
16	5.76	5.19	15.27	4.49	1.89	1.22	.83	.58	.10	.13	.21	4.16
17	5.01	5.57	14.90	4.49	1.70	1.22	.83	.54	.10	.10	.46	4.16
18	3.85	5.57	11.54	8.20	1.70	1.22	.83	.54	.10	.08	.50	4.16
19	4.00	5.57	8.20	8.71	1.70	1.22	.83	.54	.10	.05	1.08	4.16
20	2.76	5.19	7.25	8.71	1.70	1.22	.83	.54	.10	.04	1.89	4.16
21	1.89	4.83	6.37	8.71	1.70	1.22	.78	.54	.10	.02	2.08	3.85
22	2.76	4.66	5.19	8.20	1.70	1.22	.78	.54	.08	.02	2.29	3.85
23	2.63	4.49	4.49	7.02	1.70	1.22	.78	.54	.08	.01	2.76	3.85
24	2.29	4.83	3.85	4.49	1.61	1.15	.78	.54	.08	.01	2.76	3.70
25	2.29	5.57	3.55	4.16	1.61	1.15	.78	.54	.05	.01	2.52	3.55
26	2.52	5.96	3.01	3.85	1.61	1.15	.78	.46	.05	.01	2.40	3.55
27	2.76	5.96	3.01	3.27	1.61	1.08	.78	.46	.05	.00	2.19	3.55
28	2.29	6.16	3.27	2.76	1.61	1.08	.78	.46	.04	.00	2.08	3.27
29	2.29	6.80	4.00	2.52	1.53	1.08	.78	.46	.04	.00	1.98	3.27
30	2.52		4.16	2.52	1.53	1.08	.73	.35	.04	.00	1.89	3.27
31	2.76		3.85		1.53		.73	.35		.00		3.27
MIDDEL	4.45	5.28	5.91	4.40	1.83	1.29	.85	.59	.17	.09	.93	2.92
MAX	8.71	8.20	15.27	8.71	2.40	1.53	1.08	.78	.32	.26	2.76	4.16

STATION: USIA VILLAGE
MAIN RIVER: LUICHE
RIVER: LUICHE

CATCHMENT AREA: 625. KM2

[illegible]

DAILY MEANS (M³/S)

STATION: USIA VILLAGE
 MAIN RIVER: LUICHE
 RIVER: LUICHE

DATE: 88/11/24.
 YEAR: 1986

CATCHMENT AREA: 625. KM2

DATO	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DES
1	4.321	4.321	2.634	5.566	3.137	1.983	1.291	.891	.627	.321	1.367	5.376
2	8.452	4.321	2.634	6.164	4.321	1.886	1.291	.891	.627	.291	1.367	5.376
3	4.830	4.002	2.404	5.960	4.486	1.792	1.291	.891	.627	.264	1.367	8.707
4	4.656	-	2.517	5.376	4.656	1.792	1.291	.891	.627	.264	1.291	7.957
5	4.321	-	1.983	4.486	4.830	1.792	1.291	.891	.627	.264	1.217	5.190
6	8.452	-	2.083	4.002	4.830	1.983	1.291	.891	.627	.264	1.147	4.486
7	8.707	-	2.187	3.848	4.486	1.983	1.291	.891	.627	.214	1.014	4.321
8	8.707	-	2.294	3.410	4.159	1.886	1.291	.891	.582	.214	.891	7.250
9	8.202	-	2.404	4.321	4.002	1.792	1.291	.891	.497	.214	.726	8.452
10	7.957	4.321	4.159	5.008	3.698	1.792	1.291	.891	.497	.214	.675	7.957
11	7.481	4.159	5.008	5.008	3.698	1.792	1.217	.891	.497	.214	.833	7.481
12	7.023	4.002	5.376	5.008	3.410	1.792	1.217	.891	.497	.214	.726	7.023
13	6.164	3.698	5.008	4.656	3.272	1.792	1.147	.891	.457	.214	.627	7.023
14	5.761	3.552	5.008	4.656	3.137	1.792	1.147	.833	.420	.214	.538	8.202
15	4.321	3.410	4.830	-	3.006	1.792	1.147	.833	.420	.214	.497	7.716
16	3.137	3.410	7.023	4.159	2.879	1.792	1.147	.833	.457	.214	.420	7.957
17	1.792	4.002	6.802	3.698	2.879	1.613	1.147	.833	.420	.191	.385	8.707
18	4.321	4.002	6.585	3.410	2.634	1.613	1.014	.778	.385	.191	.321	9.777
19	4.486	4.486	6.164	3.137	2.634	1.613	1.014	.778	.385	.191	.264	9.502
20	5.008	5.008	6.585	3.272	2.634	1.613	1.014	.726	.385	.191	.264	9.777
21	4.656	4.159	6.372	3.410	2.517	1.613	1.014	.726	.385	.191	.214	9.502
22	6.164	4.002	5.761	3.410	2.404	1.613	1.014	.675	.385	.170	.214	9.232
23	7.957	3.698	5.376	3.272	2.404	1.446	1.014	.675	.385	.151	.191	9.232
24	7.716	3.006	5.376	3.137	2.187	1.446	1.014	.675	.352	.133	.191	8.707
25	7.957	2.634	4.656	3.137	2.187	1.446	.951	.675	.321	.133	.214	8.707
26	7.957	2.517	4.656	3.137	2.187	1.446	.951	.675	.321	.133	.264	8.202
27	7.481	2.404	5.008	3.137	2.083	1.446	.951	.675	.321	.321	2.404	7.481
28	7.250	2.517	5.761	3.137	1.983	1.446	.951	.675	.321	.538	7.716	7.023
29	5.190	-	5.566	3.006	1.983	1.446	.951	.627	.321	.891	6.585	6.802
30	4.656	-	5.376	2.879	1.983	1.291	.951	.627	.321	1.367	5.960	8.707
31	4.656	-	6.585	-	1.983	-	.891	.627	-	1.367	-	8.707
MIDDEL	6.120	-	4.651	-	3.119	1.684	1.121	.791	.457	.321	1.329	7.759
MAX	8.707	-	7.023	-	4.830	1.983	1.291	.891	.627	1.367	7.716	9.777
MTN	4.321	-	4.321	-	4.321	-	-	-	-	-	-	-

STATION: USIA VILLAGE
 MAIN RIVER: LUICHE
 RIVER: LUICHE

DAILY MEANS (M³/S)

DATE: 88/11/24.
 YEAR: 1987

CATCHMENT AREA: 625. KM2

DATO	JAN	FEB	MAR	APR	MAI	JUN	JUL	AUG	SEP	OKT	NOV	DES
1	8.20	5.38	8.20	6.16	13.15	3.85	2.76	2.08	1.37	.63	.63	1.45
2	7.25	6.37	7.96	5.76	12.81	3.70	2.76	2.08	1.37	.63	.54	1.37
3	8.20	8.45	7.72	5.57	12.49	3.70	2.76	1.89	1.37	.63	.54	1.37
4	8.97	8.71	7.72	5.57	11.23	3.55	2.63	1.89	1.37	.63	.54	1.29
5	9.23	8.71	7.25	8.97	10.06	3.55	2.63	1.89	1.37	.73	.54	1.22
6	9.78	9.23	7.72	9.50	8.97	3.41	2.52	1.89	1.22	.73	.54	1.22
7	10.34	9.50	8.71	9.78	8.71	3.27	2.52	1.89	1.22	.95	.54	1.22
8	10.34	10.06	8.97	8.97	8.20	3.27	2.52	1.89	1.22	.83	.54	1.22
9	9.78	10.93	9.78	8.71	7.48	3.27	2.52	1.79	1.22	.78	.54	1.37
10	9.50	10.93	9.23	8.20	6.16	3.27	2.52	1.79	1.22	.73	.54	1.45
11	9.23	11.54	9.23	7.48	5.76	3.27	2.52	1.79	1.22	.73	.54	1.53
12	8.71	12.49	9.23	7.25	5.19	3.14	2.52	1.70	1.22	.73	.63	1.53
13	8.97	14.18	10.34	6.80	4.83	3.14	2.52	1.70	1.22	.63	.83	1.70
14	8.97	14.90	9.78	6.37	4.83	3.14	2.52	1.70	1.22	.63	1.22	1.70
15	8.45	18.00	9.78	6.37	4.49	3.14	2.52	1.70	1.22	.63	1.22	1.89
16	7.96	18.00	11.85	6.16	4.32	3.14	2.52	1.70	1.22	.63	1.22	1.89
17	8.20	18.84	13.49	5.76	4.16	3.01	2.40	1.70	1.22	.63	1.22	1.89
18	9.23	18.84	14.18	5.38	4.16	3.01	2.40	1.70	1.15	.63	1.22	1.70
19	8.45	17.59	13.83	5.19	4.16	3.01	2.40	1.70	1.15	.63	1.22	1.53
20	7.72	16.02	14.54	6.59	4.16	3.01	2.29	1.61	1.15	.63	1.29	1.45
21	7.48	23.40	14.90	6.80	4.16	3.01	2.29	1.53	1.08	.68	1.29	1.37
22	9.78	22.92	12.49	8.71	4.00	3.01	2.29	1.53	1.08	.73	1.37	1.37
23	7.72	21.50	11.23	9.78	3.85	3.01	2.19	1.53	1.08	.78	1.37	1.29
24	7.48	18.00	10.34	11.54	3.85	3.01	2.08	1.53	1.01	.78	1.45	1.22
25	7.02	16.02	9.23	11.85	3.85	3.01	2.08	1.53	.95	.78	1.45	1.22
26	6.37	15.27	8.71	11.85	3.85	2.88	2.08	1.45	.95	.73	1.45	1.08
27	5.96	13.49	8.71	12.49	3.85	2.76	2.08	1.45	.83	.68	1.53	1.08
28	5.96	8.71	8.20	12.81	3.85	2.76	2.08	1.37	.73	.63	1.53	1.01
29	5.57		7.48	12.49	3.85	2.76	2.08	1.37	.63	.63	1.53	.95
30	5.57		6.80	12.49	3.85	2.76	2.08	1.37	.63	.63	1.53	.95
31	5.57		6.59		3.85		2.08	1.37		.63		.95
MIDDEL	8.13	13.86	9.81	8.38	6.07	3.16	2.39	1.68	1.13	.69	1.02	1.37
MAX	10.34	23.40	14.90	12.81	13.15	3.85	2.76	2.08	1.37	.95	1.53	1.89

STATION: USIA VILLAGE
MAIN RIVER: LUICHE
RIVER: LUICHE

DAILY MEANS (M³/S)

DATE: 88/11/24.
YEAR: 1988

CATCHMENT AREA: 625. KM2

DATO	JAN	FEB	MAR	APR	MAI	JUN	JUL	AUG	SEP	OKT	NOV	DES
1	.95	4.49	3.01	10.63	4.16	2.29	- 1.70	- 1.15	- 0.83	- 0.32	-	-
2	1.01	7.02	3.14	10.34	-	2.29	- "	- "	- 0.78	- "	-	-
3	1.08	8.45	3.27	10.34	3.85	2.29	- "	- "	- "	- 0.29	-	-
4	1.45	8.71	3.27	10.06	-	2.29	- "	- 1.08	- 0.73	- "	-	-
5	1.53	8.97	3.27	9.78	4.16	2.19	- "	- "	- "	- "	-	-
6	1.61	9.78	3.01	9.78	3.85	2.08	- 1.53	- "	- 0.68	- "	-	-
7	1.70	10.06	3.01	9.50	3.56	2.08	- "	- 0.95	- "	- "	-	-
8	1.70	10.06	2.63	6.80	-	2.08	- "	- "	- 0.63	- 0.26	-	-
9	1.08	10.63	2.40	6.59	3.85	2.08	- "	- "	- "	- "	-	-
10	1.08	10.93	2.40	6.16	- 3.56	2.08	- "	- "	- "	- "	-	-
11	1.15	10.93	1.89	5.96	- 3.41	2.08	- 1.45	- "	- 0.58	- "	-	-
12	1.22	11.23	1.89	5.19	- 3.27	2.08	- "	- "	- 0.54	- "	-	-
13	1.37	10.93	1.70	4.49	- "	2.08	- "	- "	- "	- 0.63	-	-
14	1.37	10.34	1.53	4.83	- "	2.08	- "	- "	- "	- "	-	-
15	1.45	10.06	1.37	4.49	- 3.01	2.08	- "	- "	- 0.50	- "	-	-
16	1.79	9.50	3.55	4.49	- "	2.08	- 1.37	- "	- "	- 0.42	-	-
17	2.52	8.97	4.49	4.16	- "	1.98	- "	- 0.89	- 0.46	- 0.89	-	-
18	3.27	8.45	7.02	4.16	- 3.14	1.98	- "	- "	- "	- 1.53	-	-
19	4.16	7.96	8.71	4.00	- 2.88	1.98	- "	- 0.83	- "	- 1.01	-	-
20	4.49	7.72	9.23	4.16	- 2.75	1.98	- "	- "	- 0.42	- 0.95	-	-
21	4.66	6.80	8.71	4.49	- "	1.98	- "	- "	- "	- 0.89	-	-
22	5.96	6.16	8.71	4.49	- "	1.98	- "	- "	- "	- 0.58	-	-
23	6.59	5.76	8.45	4.66	- "	1.89	- "	- "	- 0.39	- 0.54	-	-
24	6.59	5.19	8.20	4.16	- "	1.89	- "	- "	- "	- 0.50	-	-
25	5.96	4.16	7.72	3.85	- "	1.89	- "	- "	- "	- 0.46	-	-
26	5.57	3.85	7.96	4.00	- "	1.70	- "	- 0.78	- "	- "	-	-
27	5.19	3.55	9.78	4.16	- 2.52	1.70	- 1.29	- "	- "	- 0.42	-	-
28	5.01	1.89	10.06	4.49	- "	1.70	- "	- "	- "	- 0.39	-	-
29	4.66	1.79	10.93	4.49	- 2.40	1.70	- 1.22	- "	- 0.82	- 0.85	-	-
30	4.49		10.93	4.16	- 2.29	1.70	- "	- "	- "	- 0.24	-	-
31	4.49		11.54		- "		- "	- 0.83		- 0.21	-	-
MIDDEL	3.07	7.95	5.60	5.96	- 3.17	2.01	- 1.44	- 0.92	- 0.53	- 0.49	-	-
MAX	6.59	11.23	11.54	10.63	-	2.29	-	-	-	-	-	-

RATING CURVE

Station: MUWA

Period no. 1: 01.01.1981 - 31.12.1985

$$Q = 3.6955 * (H - 0.05) ** 2.5922$$

$$H_{min} = 0.05$$

Period no. 2: 01.01.1986 - T.D.

$$Q = 1.4000 * (H - 0.01) ** 2.5000$$

$$H_{min} = 0.01$$

DAILY MEANS (M³/S)

STATION: MUWA
MAIN RIVER: LUCHE
RIVER: LUCHE

DATE: 88/12/01.
YEAR: 1981

CATCHMENT AREA: 6.36 KM²

DATO	JAN	FEB	MAR	APR	MAI	JUN	JUL	AUG	SEP	OKT	NOV	DES
1	.027	.023	.019	.226	-	-	-	-	.023	.023	.015	.012
2	.023	.027	.023	.193	-	-	-	-	.023	.023	.012	.015
3	.019	.037	.023	.226	-	-	-	-	.023	.023	.012	.015
4	.019	.023	.023	.281	-	-	-	-	.027	.023	.015	.015
5	.023	.023	.023	.149	-	-	-	-	.023	.023	.015	.015
6	.023	.023	.019	.124	-	-	-	-	.023	.019	.015	.015
7	.023	.023	.023	.102	-	-	-	-	.023	.019	.012	.012
8	.023	.023	.027	.091	-	-	-	-	.027	.019	.015	.012
9	.023	.023	.023	.091	-	-	-	-	.027	.019	.015	.012
10	.027	.023	.019	.073	-	-	-	-	.027	.019	.012	.015
11	.023	.043	.019	.037	-	-	-	-	.023	.019	.015	.015
12	.023	.023	.023	.057	-	-	-	-	.023	.019	.012	.012
13	.023	.027	.023	.043	-	-	-	-	.019	.019	.015	.012
14	.023	.027	.023	.043	-	-	-	-	.027	.019	.015	.012
15	.023	.027	.023	.043	-	-	-	-	.023	.019	.015	.012
16	.023	.023	.023	.043	-	-	-	-	.023	.015	.012	.009
17	.023	.027	.023	.037	-	-	-	-	.027	.012	.015	.009
18	.023	.027	.027	.023	-	-	-	-	.023	.012	.012	.009
19	.023	.027	.027	.015	-	-	-	-	.023	.012	.015	.012
20	.023	.091	.023	.023	-	-	-	-	.023	.012	.012	.012
21	.023	.032	.023	.032	-	-	-	-	.023	.012	.015	.012
22	.023	.037	.023	.015	-	-	-	-	.027	.012	.012	.012
23	.027	.027	.023	.019	-	-	-	-	.023	.009	.009	.012
24	.023	.023	.050	.027	-	-	-	-	.023	.009	.015	.012
25	.023	.032	.091	.023	-	-	-	-	.023	.019	.012	.015
26	.027	.032	.065	.032	-	-	-	-	.023	.015	.012	.012
27	.023	.023	.043	.032	-	-	-	-	.023	.009	.009	.015
28	.023	.032	.050	.032	-	-	-	-	.023	.009	.012	.015
29	.027		.032	.032	-	-	-	-	.023	.009	.012	.012
30	.023		.226	.032	-	-	-	-	.019	.015	.012	.012
31	.023		.226		-		-	-		.015		.012
MIDDEL	.023	.029	.042	.073	-	-	-	-	.023	.016	.013	.012
MAX	.027	.091	.226	.281	-	-	-	-	.027	.023	.015	.015
MIN	.019	.023	.019	.015	-	-	-	-	.019	.009	.009	.009

10 d = 9.9

DAILY MEANS (M³/S)

STATION: MUWA
 MAIN RIVER: LUICHE
 RIVER: LUICHE

DATE: 88/12/01.

YEAR: 1982

CATCHMENT AREA: 6.36 KM2

DATO	JAN	FEB	MAR	APR	MAI	JUN	JUL	AUG	SEP	OKT	NOV	DES
1	.027	.019	.091	.027	.015	.015	.012	.009	.009	.007	.019	.124
2	.019	.015	.073	.057	.015	.019	.012	.009	.007	.007	.019	.124
3	.019	.015	.065	.091	.012	.019	.012	.009	.007	.007	.019	.124
4	.023	.012	.032	.065	.019	.019	.012	.009	.007	.007	.019	.149
5	.027	.015	.032	.032	.027	.019	.012	.009	.007	.007	.027	.149
6	.019	.015	.027	.032	.027	.019	.012	.009	.007	.007	.027	.102
7	.023	.019	.065	.019	.019	.019	.012	.009	.007	.007	.027	.102
8	.019	.023	.057	.019	.019	.015	.012	.009	.007	.007	.019	.082
9	.019	.023	.050	.023	.015	.015	.012	.009	.007	.007	.019	.082
10	.023	.057	.050	.019	.027	.019	.012	.009	.007	.007	.019	.102
11	.019	.027	.027	.015	.023	.019	.012	.009	.007	.012	.019	.102
12	.023	.023	.027	.015	.019	.015	.012	.009	.007	.012	.019	.082
13	.019	.050	.019	.015	.019	.015	.012	.009	.007	.019	.015	.082
14	.019	.019	.019	.019	.019	.015	.012	.009	.007	.019	.015	.065
15	.023	.015	.019	.015	.015	.015	.012	.009	.007	.019	.015	.065
16	.027	.023	.023	.015	.019	.015	.012	.009	.007	.019	.027	.050
17	.019	.023	.015	.019	.015	.015	.012	.009	.007	.019	.027	.050
18	.019	.023	.015	.027	.015	.015	.012	.009	.007	.015	.027	.027
19	.019	.032	.019	.019	.015	.015	.012	.009	.007	.015	.037	.027
20	.027	.019	.023	.032	.015	.015	.012	.009	.007	.015	.037	.023
21	.050	.019	.023	.027	.015	.015	.012	.009	.007	.015	.037	.023
22	.019	.019	.023	.023	.012	.015	.012	.009	.007	.015	.050	.019
23	.023	.019	.023	.019	.012	.015	.012	.009	.007	.027	.050	.027
24	.023	.015	.019	.032	.012	.015	.012	.009	.007	.027	.050	.027
25	.019	.015	.019	.043	.019	.015	.012	.009	.007	.027	.037	.037
26	.019	.019	.015	.027	.015	.015	.012	.009	.007	.027	.037	.043
27	.023	.027	.015	.023	.015	.015	.012	.009	.007	.019	.050	.050
28	.019	.019	.012	.019	.015	.012	.012	.009	.007	.019	.050	.027
29	.012		.019	.015	.015	.012	.012	.009	.007	.019	.065	.027
30	.027		.023	.015	.015	.012	.012	.009	.007	.019	.082	.019
31	.019		.027		.019		.012	.009		.019		.019
MIDDEL	.022	.022	.031	.027	.017	.015	.012	.009	.007	.015	.032	.065
MAX	.050	.057	.091	.091	.027	.019	.012	.009	.009	.027	.082	.149
MIN	.012	.012	.012	.015	.012	.012	.012	.009	.007	.007	.015	.019

10 d = 7x

DAILY MEANS (M³/S)

STATION: MUWA
MAIN RIVER: LUICHE
RIVER: LUICHE

DATE: 88/12/01.
YEAR: 1983

CATCHMENT AREA: 6.36 KM2

DATO	JAN	FEB	MAR	APR	MAI	JUN	JUL	AUG	SEP	OKT	NOV	DES
1	.019	.019	.209	.027	.102	.073	.057	.043	.023	.019	.015	.027
2	.019	.019	.082	.050	.102	.073	.057	.043	.023	.019	.015	.027
3	.019	.015	.082	.050	.082	.073	.057	.043	.023	.015	.015	.027
4	.027	.015	.065	.050	.082	.065	.057	.043	.023	.015	.015	.050
5	.027	.019	.065	.082	.082	.065	.057	.043	.023	.015	.015	.050
6	.027	.019	.050	.082	.082	.065	.057	.043	.023	.015	.015	.065
7	.027	.027	.050	.082	.082	.065	.057	.043	.019	.015	.015	.057
8	.019	.050	.050	.082	.082	.065	.050	.037	.019	.015	.015	.050
9	.019	.065	.082	.124	.082	.065	.050	.037	.019	.015	.015	.050
10	.019	.065	.082	.124	.082	.065	.050	.037	.019	.015	.015	.050
11	.015	.065	.102	.102	.124	.065	.050	.037	.019	.015	.015	.050
12	.015	.082	.082	.102	.124	.065	.050	.037	.019	.015	.015	.043
13	.015	.149	.027	.102	.124	.065	.050	.032	.019	.015	.015	.043
14	.027	.149	.102	.082	.102	.065	.050	.032	.019	.015	.015	.043
15	.027	.102	.082	.082	.102	.065	.050	.032	.019	.015	.015	.043
16	.027	.102	.082	.082	.102	.065	.050	.027	.019	.015	.015	.043
17	.019	.124	.065	.082	.102	.065	.050	.027	.019	.015	.015	.043
18	.019	.124	.065	.082	.102	.065	.050	.027	.019	.015	.015	.037
19	.019	.102	.065	.102	.082	.065	.050	.027	.019	.015	.015	.037
20	.019	.209	.050	.102	.082	.057	.043	.027	.019	.015	.015	.037
21	.015	.209	.050	.124	.082	.057	.043	.027	.019	.015	.015	.037
22	.015	.177	.050	.124	.082	.057	.043	.023	.019	.015	.015	.037
23	.015	.177	.050	.124	.073	.057	.043	.023	.019	.015	.015	.037
24	.027	.149	.037	.102	.073	.057	.043	.023	.019	.015	.015	.050
25	.023	.149	.037	.102	.073	.057	.043	.023	.019	.015	.015	.050
26	.023	.102	.037	.102	.073	.057	.043	.023	.019	.015	.019	.050
27	.019	.102	.037	.082	.073	.057	.043	.023	.019	.015	.019	.043
28	.019	.102	.027	.082	.073	.057	.043	.023	.019	.015	.027	.043
29	.019		.037	.082	.073	.057	.043	.023	.019	.015	.027	.050
30	.019		.037	.102	.073	.057	.043	.023	.019	.015	.027	.050
31	.019		.027		.073		.043	.023		.015		.050
MIDDEL	.020	.096	.063	.089	.087	.062	.048	.031	.019	.015	.016	.044
MAX	.027	.209	.209	.124	.124	.073	.057	.043	.023	.019	.027	.065
MIN	.015	.015	.027	.027	.073	.057	.043	.023	.019	.015	.015	.027

10 d = 151

DAILY MEANS (M³/S)

STATION: MUWA
MAIN RIVER: LUICHE
RIVER: LUICHE

DATE: 88/12/01.
YEAR: 1986

CATCHMENT AREA: 6.36 KM2

DATO	JAN	FEB	MAR	APR	MAI	JUN	JUL	AUG	SEP	OKT	NOV	DES
1	-	-	-	-	-	-	.032	.028	.022	.019	.032	.040
2	-	-	-	-	-	-	.032	.028	.022	.017	.032	.040
3	-	-	-	-	-	-	.032	.028	.022	.017	.028	.048
4	-	-	-	-	-	-	.032	.028	.022	.017	.022	.069
5	-	-	-	-	-	-	.032	.028	.022	.025	.022	.048
6	-	-	-	-	-	-	.032	.028	.022	.022	.022	.069
7	-	-	-	-	-	-	.032	.025	.022	.028	.032	.081
8	-	-	-	-	-	-	.032	.025	.022	.019	.032	.069
9	-	-	-	-	-	-	.032	.025	.022	.019	.022	.075
10	-	-	-	-	-	-	.032	.025	.022	.022	.022	.101
11	-	-	-	-	-	-	.032	.025	.022	.019	.019	.094
12	-	-	-	-	-	-	.032	.025	.022	.028	.019	.069
13	-	-	-	-	-	-	.032	.025	.022	.022	.025	.069
14	-	-	-	-	-	-	.032	.025	.022	.025	.022	.094
15	-	-	-	-	-	-	.032	.025	.022	.022	.017	.075
16	-	-	-	-	-	-	.032	.025	.022	.019	.019	.032
17	-	-	-	-	-	-	.028	.025	.022	.017	.019	.058
18	-	-	-	-	-	-	.028	.025	.022	.022	.019	.048
19	-	-	-	-	-	-	.028	.025	.022	.019	.028	.040
20	-	-	-	-	-	-	.028	.025	.022	.022	.025	.069
21	-	-	-	-	-	-	.028	.025	.022	.017	.025	.058
22	-	-	-	-	-	-	.028	.025	.022	.022	.032	.063
23	-	-	-	-	-	-	.028	.025	.022	.019	.058	.048
24	-	-	-	-	-	-	.028	.025	.022	.022	.075	.053
25	-	-	-	-	-	-	.028	.025	.022	.022	.125	.053
26	-	-	-	-	-	-	.028	.025	.022	.028	.109	.044
27	-	-	-	-	-	-	.028	.025	.019	.028	.040	.036
28	-	-	-	-	-	-	.028	.025	.019	.036	.040	.048
29	-	-	-	-	-	-	.028	.025	.019	.032	.069	.058
30	-	-	-	-	-	-	.028	.025	.019	.032	.048	.048
31	-	-	-	-	-	-	.028	.025		.053		.053
MIDDEL	-	-	-	-	-	-	.030	.025	.021	.023	.036	.059
MAX	-	-	-	-	-	-	.032	.028	.022	.053	.125	.101
MIN	-	-	-	-	-	-	.028	.025	.019	.017	.017	.032

10 d. = 17.

STATION: MUWA
MAIN RIVER: LUCHE
RIVER: LUCHE

DAILY MEANS (M³/S)

DATE: 88/12/01.
YEAR: 1987

CATCHMENT AREA: 6.36 KM2

DATO	JAN	FEB	MAR	APR	MAI	JUN	JUL	AUG	SEP	OKT	NOV	DES
1	.040	.081	.048	.069	.069	.040	.044	.032	.036	.032	.028	.028
2	.048	.058	.040	.053	.081	.048	.040	.044	.032	.036	.022	.032
3	.053	.069	.058	.075	.058	.058	.048	.032	.032	.036	.017	.028
4	.040	.069	.048	.088	.081	.044	.040	.032	.028	.032	.014	.019
5	.058	.058	.048	.081	.053	.040	.032	.040	.036	.028	.014	.028
6	.063	.048	.069	.069	.063	.058	.040	.032	.028	.032	.014	.028
7	.058	.081	.058	.069	.069	.048	.032	.032	.032	.032	.014	.028
8	.081	.069	.069	.081	.075	.040	.036	.036	.032	.032	.014	.019
9	.075	.058	.094	.081	.048	.053	.040	.032	.028	.028	.014	.014
10	.058	.048	.081	.058	.058	.053	.044	.032	.040	.028	.012	.019
11	.094	.058	.069	.069	.069	.044	.048	.036	.032	.032	.014	.017
12	.058	.069	.063	.058	.058	.058	.036	.028	.032	.028	.017	.014
13	.088	.094	.058	.075	.048	.036	.040	.032	.036	.032	.017	.012
14	.048	.081	.069	.058	.048	.040	.028	.032	.028	.036	.012	.017
15	.069	.069	.048	.063	.040	.053	.032	.028	.032	.032	.014	.019
16	.048	.058	.058	.048	.048	.044	.032	.028	.028	.028	.032	.025
17	.063	.069	.048	.058	.069	.048	.040	.028	.040	.036	.028	.036
18	.081	.081	.081	.048	.058	.040	.036	.032	.036	.036	.025	.044
19	.053	.058	.081	.053	.053	.048	.028	.040	.032	.032	.028	.036
20	.058	.053	.075	.058	.044	.040	.040	.032	.028	.032	.025	.032
21	.044	.081	.069	.048	.058	.048	.032	.028	.036	.040	.025	.032
22	.048	.058	.094	.063	.040	.040	.032	.040	.028	.044	.017	.025
23	.048	.048	.069	.048	.044	.048	.040	.032	.036	.032	.019	.022
24	.032	.040	.081	.048	.048	.040	.032	.028	.028	.036	.014	.019
25	.044	.032	.058	.069	.040	.032	.032	.028	.028	.028	.014	.019
26	.069	.025	.058	.058	.036	.044	.040	.036	.036	.028	.014	.025
27	.048	.040	.048	.063	.040	.040	.032	.028	.032	.036	.017	.022
28	.032	.040	.063	.063	.063	.044	.040	.040	.032	.028	.022	.028
29	.032		.048	.081	.069	.040	.032	.028	.028	.028	.032	.032
30	.069		.058	.063	.075	.044	.032	.036	.036	.032	.025	.028
31	.094		.048		.075		.028	.028		.028		.028
MIDDEL	.057	.060	.063	.063	.057	.045	.036	.032	.032	.032	.019	.025
MAX	.094	.094	.094	.088	.081	.058	.048	.044	.040	.044	.032	.044
MIN	.032	.025	.040	.048	.036	.032	.028	.028	.028	.028	.012	.012

10 d = 13.

44.7

DAILY MEANS (M³/S)

STATION: MUWA
MAIN RIVER: LUICHE
RIVER: LUICHE

DATE: 88/12/01.
YEAR: 1988

CATCHMENT AREA: 6.36 KM²

DATO	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DES
1	.032	.032	.032	.053	.028	.025	.022	.019	.017	.017	.012	-
2	.032	.048	.032	.040	.032	.025	.022	.019	.017	.017	-	-
3	.040	.036	.032	.040	.036	.025	.022	.019	.017	.017	-	-
4	.032	.032	.032	.028	.036	.025	.022	.019	.017	.017	-	-
5	.036	.040	.032	.028	.032	.025	.022	.019	.017	.017	-	-
6	.028	.040	.036	.028	.032	.025	.022	.019	.017	.017	-	-
7	.028	.040	.040	.032	.032	.025	.022	.019	.017	.017	-	-
8	.028	.044	.036	.036	.036	.025	.022	.019	.017	.017	-	-
9	.025	.058	.040	.032	.028	.025	.022	.019	.017	.017	-	-
10	.028	.048	.044	.044	.028	.025	.022	.019	.017	.017	-	-
11	.032	.040	.036	.036	.032	.025	.022	.017	.017	.017	-	-
12	.028	.048	.032	.032	.032	.025	.022	.017	.017	.017	-	-
13	.040	.040	.032	.048	.028	.025	.022	.017	.017	.025	-	-
14	.036	.032	.032	.048	.032	.025	.022	.017	.017	.022	-	-
15	.036	.036	.032	.044	.032	.025	.022	.017	.017	.025	-	-
16	.040	.036	.044	.032	.028	.022	.019	.017	.017	.017	-	-
17	.040	.032	.032	.028	.025	.022	.019	.017	.017	.017	-	-
18	.036	.040	.028	.032	.028	.022	.019	.017	.017	.017	-	-
19	.032	.040	.032	.048	.022	.022	.019	.017	.017	.017	-	-
20	.028	.040	.040	.040	.025	.022	.019	.017	.017	.017	-	-
21	.036	.040	.040	.032	.028	.022	.019	.017	.017	.017	-	-
22	.040	.036	.040	.032	.025	.022	.019	.017	.017	.017	-	-
23	.036	.036	.036	.028	.028	.022	.019	.017	.017	.017	-	-
24	.044	.028	.053	.028	.028	.022	.019	.017	.017	.014	-	-
25	.036	.028	.044	.032	.025	.022	.019	.017	.017	.014	-	-
26	.036	.036	.040	.032	.019	.022	.019	.017	.017	.014	-	-
27	.032	.036	.040	.028	.022	.022	.019	.017	.017	.014	-	-
28	.032	.028	.044	.028	.019	.022	.019	.017	.017	.014	-	-
29	.032	.036	.040	.028	.019	.022	.019	.017	.017	.014	-	-
30	.028		.048	.032	.025	.022	.019	.017	.017	.014	-	-
31	.028		.044		.022		.019	.017		.014	-	-
MIDDEL	.033	.038	.037	.034	.027	.023	.020	.017	.017	.016	-	-
MAX	.044	.058	.053	.053	.036	.025	.022	.019	.017	.025	-	-
MIN	.025	.028	.028	.028	.019	.022	.019	.017	.017	.014	-	-

10 d. = 14.9

25-5

RATING CURVE

Station: **MOMOKA**

Period no. 1: 01.01.1986 - T.D.

$$Q = 1.4000 * (H - 0) ** 2.5000$$

$$H_{min} = 0$$

STATION: MOMOKA
MAIN RIVER: MOMOKA
RIVER: LUICHE

DAILY MEANS (M³/S)

DATE: 88/12/01.
YEAR: 1986

CATCHMENT AREA: 6.47 KM2

DATO	JAN	FEB	MAR	APR	MAI	JUN	JUL	AUG	SEP	OKT	NOV	DES
1	-	-	-	-	.032	.025	.019	.014	.012	.009	.142	.032
2	-	-	-	-	.032	.025	.019	.014	.012	.009	.019	.032
3	-	-	-	-	.032	.022	.019	.014	.012	.009	.014	.048
4	-	-	-	-	.032	.022	.019	.014	.012	.009	.014	.048
5	-	-	-	-	.032	.022	.019	.014	.012	.009	.010	.048
6	-	-	-	-	.032	.022	.019	.014	.012	.009	.010	.032
7	-	-	-	-	.032	.022	.019	.014	.012	.009	.010	.032
8	-	-	-	-	.028	.022	.019	.014	.010	.009	.010	.032
9	-	-	-	-	.028	.022	.017	.014	.010	.007	.010	.032
10	-	-	-	.069	.028	.022	.017	.014	.010	.007	.010	.032
11	-	-	-	.058	.028	.022	.017	.014	.010	.014	.007	.032
12	-	-	-	.048	.028	.022	.017	.014	.010	.014	.007	.048
13	-	-	-	.044	.028	.022	.017	.014	.010	.014	.007	.048
14	-	-	-	.040	.028	.022	.017	.014	.010	.014	.007	.048
15	-	-	-	.040	.028	.022	.017	.012	.010	.014	.007	.048
16	-	-	-	.040	.028	.022	.017	.012	.010	.007	.007	.040
17	-	-	-	.040	.028	.022	.017	.012	.010	.007	.007	.048
18	-	-	-	.036	.028	.022	.017	.012	.010	.007	.007	.048
19	-	-	-	.036	.025	.022	.017	.012	.010	.007	.007	.048
20	-	-	-	.036	.025	.022	.017	.012	.010	.007	.007	.048
21	-	-	-	.036	.025	.019	.017	.012	.010	.007	.007	.048
22	-	-	-	.036	.025	.019	.017	.012	.010	.007	.007	.048
23	-	-	-	.036	.025	.019	.017	.012	.010	.007	.007	.040
24	-	-	-	.036	.025	.019	.017	.012	.010	.007	.007	.040
25	-	-	-	.036	.025	.019	.017	.012	.010	.010	.007	.040
26	-	-	-	.036	.025	.019	.017	.012	.010	.010	.007	.040
27	-	-	-	.036	.025	.019	.017	.012	.009	.010	.032	.048
28	-	-	-	.036	.025	.019	.017	.012	.009	.010	.032	.048
29	-	-	-	.032	.025	.019	.017	.012	.009	.142	.032	.048
30	-	-	-	.032	.025	.019	.014	.012	.009	.142	.032	.040
31	-	-	-	-	.025	-	.014	.012	-	.142	-	.040
MIDDEL	-	-	-	-	.027	.021	.017	.012	.010	.022	.016	.042
MAX	-	-	-	-	.032	.025	.019	.014	.012	.142	.142	.048
MIN	-	-	-	-	.025	.019	.014	.012	.009	.007	.007	.032

DAILY MEANS (M³/S)

STATION: MOMOKA
MAIN RIVER: MOMOKA
RIVER: LUICHE

DATE: 88/12/01.

YEAR: 1987

CATCHMENT AREA: 6.47 KM2

DATO	JAN	FEB	MAR	APR	MAI	JUN	JUL	AUG	SEP	OKT	NOV	DES
1	.048	.081	.069	.058	.058	.032	.025	.019	.019	.014	.010	.014
2	.040	.081	.069	.058	.063	.032	.025	.019	.019	.014	.010	.014
3	.040	.069	.058	.048	.069	.032	.025	.019	.019	.014	.010	.014
4	.040	.063	.058	.058	.058	.032	.025	.019	.019	.014	.010	.014
5	.040	.058	.058	.063	.048	.032	.025	.019	.019	.014	.010	.014
6	.032	.058	.053	.069	.048	.032	.025	.019	.019	.014	.010	.014
7	.048	.048	.048	.058	.058	.032	.025	.019	.019	.014	.010	.014
8	.048	.058	.058	.088	.048	.032	.025	.019	.017	.014	.010	.014
9	.048	.048	.058	.081	.058	.032	.025	.019	.014	.014	.010	.014
10	.048	.053	.063	.063	.048	.032	.025	.019	.014	.014	.010	.014
11	.048	.058	.069	.058	.048	.032	.025	.019	.014	.014	.010	.014
12	.040	.058	.063	.058	.048	.032	.025	.019	.014	.014	.010	.014
13	.040	.058	.058	.058	.040	.032	.025	.019	.014	.014	.010	.014
14	.048	.048	.081	.048	.036	.032	.025	.019	.014	.014	.010	.010
15	.048	.048	.069	.048	.032	.032	.022	.019	.014	.012	.010	.010
16	.048	.069	.069	.048	.032	.032	.019	.019	.014	.010	.010	.010
17	.048	.063	.058	.040	.032	.032	.019	.019	.014	.010	.010	.010
18	.040	.069	.201	.040	.025	.032	.019	.019	.014	.010	.010	.010
19	.081	.058	.223	.044	.028	.032	.019	.019	.014	.010	.010	.010
20	.081	.058	.180	.048	.032	.032	.019	.019	.014	.010	.010	.010
21	.069	.069	.190	.048	.032	.032	.019	.019	.014	.010	.010	.007
22	.069	.081	.081	.040	.032	.032	.019	.019	.014	.010	.010	.007
23	.058	.094	.069	.040	.032	.032	.019	.019	.014	.010	.012	.007
24	.058	.109	.069	.040	.032	.032	.019	.019	.014	.010	.014	.007
25	.048	.109	.069	.044	.032	.032	.019	.019	.014	.010	.014	.007
26	.048	.094	.069	.048	.032	.032	.019	.019	.014	.010	.014	.007
27	.048	.075	.069	.044	.032	.028	.019	.019	.014	.010	.014	.007
28	.048	.069	.063	.040	.032	.025	.019	.019	.014	.010	.014	.007
29	.044		.058	.125	.032	.025	.019	.019	.014	.010	.014	.007
30	.044		.058	.058	.032	.025	.019	.019	.014	.010	.014	.007
31	.053		.058		.032		.019	.019		.010		.012
MIDDEL	.049	.068	.081	.055	.040	.031	.021	.019	.015	.011	.011	.010
MAX	.081	.109	.223	.125	.069	.032	.025	.019	.019	.014	.014	.014
MIN	.032	.048	.048	.040	.025	.025	.019	.019	.014	.010	.010	.007

37.3

DAILY MEANS (M³/S)

STATION: MOMOKA
 MAIN RIVER: MOMOKA
 RIVER: LUICHE

DATE: 88/12/01.
 YEAR: 1988

CATCHMENT AREA: 6.47 KM2

DATO	JAN	FEB	MAR	APR	MAI	JUN	JUL	AUG	SEP	OKT	NOV	DES
1	.019	.019	.019	.534	.032	.019	.025	.019	.010	.010	-	-
2	.019	.019	.019	.081	.032	.025	.022	.019	.010	.010	-	-
3	.019	.019	.019	.075	.032	.025	.019	.019	.010	.010	-	-
4	.025	.019	.019	.069	.032	.025	.019	.019	.010	.010	-	-
5	.025	.025	.019	.058	.032	.025	.019	.019	.010	.010	-	-
6	.025	.025	.025	.053	.032	.025	.019	.019	.010	.010	-	-
7	.025	.025	.025	.048	.025	.025	.019	.019	.010	.010	-	-
8	.025	.025	.025	.048	.025	.025	.019	.019	.010	.010	-	-
9	.025	.040	.025	.048	.025	.025	.019	.019	.010	.010	-	-
10	.025	.032	.025	.048	.025	.025	.019	.019	.010	.010	-	-
11	.025	.032	.025	.044	.025	.025	.019	.019	.010	.010	-	-
12	.025	.036	.022	.040	.025	.025	.019	.019	.010	.010	-	-
13	.025	.040	.019	.040	.025	.025	.019	.019	.010	.032	-	-
14	.032	.040	.019	.040	.025	.025	.019	.019	.010	.032	-	-
15	.032	.032	.019	.040	.025	.025	.019	.019	.010	.032	-	-
16	.025	.032	.022	.040	.025	.025	.019	.017	.010	.014	-	-
17	.025	.032	.022	.040	.025	.025	.019	.014	.010	.012	-	-
18	.032	.032	.032	.040	.025	.025	.019	.014	.010	.010	-	-
19	.032	.032	.032	.040	.025	.025	.019	.014	.010	.010	-	-
20	.032	.025	.032	.040	.025	.025	.019	.014	.010	.010	-	-
21	.032	.025	.032	.040	.025	.025	.019	.014	.010	.010	-	-
22	.025	.025	.069	.040	.025	.025	.019	.014	.010	.010	-	-
23	.025	.019	.069	.040	.025	.025	.019	.014	.010	.010	-	-
24	.025	.019	.058	.036	.025	.025	.019	.014	.010	.010	-	-
25	.025	.025	.058	.032	.025	.025	.019	.014	.010	.010	-	-
26	.025	.032	.058	.032	.019	.025	.019	.014	.010	.010	-	-
27	.025	.025	.069	.032	.019	.025	.019	.014	.010	.010	-	-
28	.025	.025	.058	.032	.019	.025	.019	.014	.010	.010	-	-
29	.019	.025	.058	.032	.019	.025	.019	.012	.010	.010	-	-
30	.019		.058	.032	.019	.025	.019	.010	.010	.010	-	-
31	.019		.058		.019		.019	.010		.010		-
MIDDEL	.025	.027	.035	.060	.025	.024	.019	.016	.010	.012	-	-
MAX	.032	.040	.069	.534	.032	.025	.025	.019	.010	.032	-	-
MIN	.019	.019	.019	.032	.019	.019	.019	.010	.010	.010	-	-

RATING CURVE

Station: **WIPANGA**

Period no. 1: 01.01.1981 - 31.12.1985

$$Q = 1.9507 * (H - 0.09) ** 1.7956$$

$$H_{min} = 0.09$$

Period no. 2: 01.01.1986 - T.D.

$$Q = 1.4000 * (H - 0) ** 2.5000$$

$$H_{min} = 0$$

DAILY MEANS (M³/S)

STATION: WIPANGA
 MAIN RIVER: KANANTUMBI
 RIVER: LUICHE

DATE: 89/01/27.
 YEAR: 1981

CATCHMENT AREA: 5.69 KM2

DATO	JAN	FEB	MAR	APR	MAI	JUN	JUL	AUG	SEP	OKT	NOV	DES
1	-	-	-	.393	.043	.050	.037	.037	.026	.026	.021	.026
2	-	-	-	.393	.043	.050	.037	.037	.026	.026	.021	.026
3	-	-	-	.393	.043	.050	.037	.037	.026	.026	.021	.050
4	-	-	-	.393	.043	.037	.037	.031	.026	.026	.021	.050
5	-	-	-	.393	.043	.037	.037	.031	.026	.026	.021	.050
6	-	-	-	.393	.043	.037	.037	.031	.026	.026	.021	.050
7	-	-	-	.393	.043	.037	.037	.026	.026	.026	.021	.050
8	-	-	-	.393	.043	.037	.037	.026	.026	.026	.016	.026
9	-	-	-	.118	.043	.037	.037	.026	.026	.026	.016	.026
10	-	-	-	.118	.043	.037	.037	.026	.026	.026	.016	.026
11	-	-	.037	.118	.043	.037	.037	.026	.026	.026	.016	.026
12	-	-	.037	.118	.043	.037	.037	.026	.026	.026	.016	.026
13	-	-	.037	.118	.043	.037	.037	.026	.026	.026	.016	.026
14	-	-	.037	.081	.043	.037	.037	.026	.026	.026	.016	.026
15	-	-	.037	.081	.043	.037	.037	.026	.026	.026	.016	.026
16	-	-	.037	.081	.043	.037	.037	.026	.026	.026	.016	.021
17	-	-	.037	.050	.043	.037	.037	.026	.026	.026	.016	.021
18	-	-	.037	.050	.043	.037	.037	.026	.026	.026	.016	.016
19	-	-	.037	.050	.043	.037	.037	.026	.026	.026	.016	.016
20	-	-	.037	.050	.043	.037	.037	.026	.026	.026	.016	.016
21	-	-	.037	.050	.043	.037	.037	.026	.026	.026	.016	.016
22	-	-	.037	.050	.043	.037	.037	.026	.026	.026	.016	.016
23	-	-	.037	.050	.043	.037	.037	.026	.026	.026	.016	.016
24	-	-	.037	.050	.043	.037	.037	.026	.026	.026	.016	.016
25	-	-	.037	.050	.043	.037	.037	.026	.026	.021	.026	.026
26	-	-	.037	.050	.043	.037	.037	.026	.026	.021	.026	.026
27	-	-	.037	.050	.043	.037	.037	.026	.026	.021	.026	.026
28	-	-	.037	.050	.043	.037	.037	.026	.026	.021	.026	.026
29	-	-	.037	.050	.043	.037	.037	.026	.026	.021	.026	.026
30	-	-	.037	.050	.043	.037	.037	.026	.026	.021	.026	.026
31	-	-	.376		.043		.037	.026		.021		.026
MIDDEL	-	-	-	.155	.043	.038	.037	.027	.026	.024	.019	.027
MAX	-	-	-	.393	.043	.050	.037	.037	.026	.026	.026	.050
MIN	-	-	-	.050	.043	.037	.037	.026	.026	.021	.016	.016

DAILY MEANS (M³/S)

STATION: WIPANGA
MAIN RIVER: KANANTUMBI
RIVER: LUICHE

DATE: 89/01/27.
YEAR: 1982

CATCHMENT AREA: 5.69 KM2

DATO	JAN	FEB	MAR	APR	MAI	JUN	JUL	AUG	SEP	OKT	NOV	DES
1	.037	.037	1.582	.037	.026	.026	.016	.016	.016	.012	.016	.037
2	.037	.037	1.002	.037	.026	.026	.016	.016	.016	.012	.016	.037
3	.037	.037	.065	.037	.026	.026	.016	.016	.016	.012	.016	.099
4	.037	.037	.065	.037	.026	.026	.016	.016	.016	.012	.016	.099
5	.037	.037	.065	.037	.026	.026	.016	.016	.016	.012	.016	.099
6	.037	.065	.065	.037	.026	.026	.016	.016	.016	.012	.016	.099
7	.037	.065	.065	.037	.026	.026	.016	.016	.016	.012	.016	.026
8	.037	.065	.065	.037	.026	.026	.016	.016	.016	.012	.016	.026
9	.037	.050	.050	.037	.026	.026	.016	.016	.016	.012	.016	.026
10	.037	.050	.050	.037	.026	.026	.016	.016	.016	.012	.016	.026
11	.037	.050	.050	.037	.026	.026	.016	.016	.016	.012	.016	.026
12	.037	.118	.050	.037	.026	.026	.016	.016	.016	.012	.016	.026
13	.037	.118	.037	.037	.026	.026	.016	.016	.016	.012	.016	.026
14	.037	.099	.037	.037	.026	.026	.016	.016	.016	.012	.016	.026
15	.037	.081	.037	.037	.026	.026	.016	.016	.016	.012	.016	.026
16	.037	.081	.037	.037	.026	.026	.016	.016	.016	.012	.016	.026
17	.037	.081	.050	.031	.026	.026	.016	.016	.016	.012	.016	.026
18	.037	.118	.050	.026	.026	.016	.016	.016	.016	.012	.012	.582
19	.026	.050	.050	.026	.026	.016	.016	.016	.016	.012	.012	.522
20	.026	.050	.050	.026	.026	.016	.016	.016	.016	.012	.012	.465
21	.026	.050	.050	.026	.026	.016	.016	.016	.016	.012	.012	.360
22	.026	.050	.037	.026	.026	.016	.016	.016	.016	.050	.009	.360
23	.021	.037	.037	.026	.026	.016	.016	.016	.016	.016	.009	.360
24	.021	.037	.037	.026	.026	.016	.016	.016	.016	.016	.009	.266
25	.016	.037	.037	.026	.026	.016	.016	.016	.016	.016	.012	.266
26	.016	.026	.037	.026	.026	.016	.016	.016	.016	.016	.016	.238
27	.016	.026	.037	.026	.026	.016	.016	.016	.016	.012	.016	.211
28	.016	.026	.037	.026	.026	.016	.016	.016	.016	.012	.031	.174
29	.037		.037	.026	.026	.016	.016	.016	.016	.016	.043	.139
30	.037		.037	.026	.026	.016	.016	.016	.016	.016	.037	.129
31	.037		.037		.026		.016	.016		.016		.118
MIDDEL	.031	.057	.127	.032	.026	.021	.016	.016	.016	.014	.016	.159
MAX	.037	.118	1.582	.037	.026	.026	.016	.016	.016	.050	.043	.582
MIN	.016	.026	.037	.026	.026	.016	.016	.016	.016	.012	.009	.026

DAILY MEANS (M³/S)

STATION: WIPANGA
 MAIN RIVER: KANANTUMBI
 RIVER: LUICHE

DATE: 89/01/27.
 YEAR: 1983

CATCHMENT AREA: 5.69 KM2

DATO	JAN	FEB	MAR	APR	MAI	JUN	JUL	AUG	SEP	OKT	NOV	DES
1	.266	.050	.099	.037	.037	.037	.037	.037	.037	.037	.026	-
2	.266	.050	.099	.037	.037	.037	.037	.037	.037	.037	.026	-
3	.266	.050	.099	.037	.037	.037	.037	.037	.037	.037	.026	-
4	.099	.081	.099	.037	.037	.037	.037	.037	.037	.037	.026	-
5	.099	.081	.099	.037	.037	.037	.037	.037	.037	.037	.026	-
6	.099	.081	.050	.037	.037	.037	.037	.037	.037	.037	.026	-
7	.099	.118	.050	.037	.037	.037	.037	.037	.037	.037	.026	-
8	.037	.118	.050	.037	.037	.037	.037	.037	.037	.037	.026	-
9	.037	.118	.050	.037	.037	.037	.037	.037	.037	.026	.026	-
10	.037	.118	.050	.081	.037	.037	.037	.037	.037	.026	.026	-
11	.037	.050	.050	.081	.037	.037	.037	.037	.037	.026	.026	-
12	.360	.050	.050	.081	.037	.037	.037	.037	.037	.026	.026	-
13	.360	.050	.037	.081	.037	.037	.037	.037	.037	.026	.026	-
14	.360	.118	.037	.050	.037	.037	.037	.037	.037	.026	.026	-
15	.360	.118	.037	.050	.037	.037	.037	.037	.037	.026	.026	-
16	.050	.118	.037	.050	.037	.037	.037	.037	.037	.026	.026	-
17	.050	.211	.037	.050	.037	.037	.037	.037	.037	.026	.026	-
18	.050	.211	.037	.050	.037	.037	.037	.037	.037	.026	.026	-
19	.050	.211	.037	.050	.037	.037	.037	.037	.037	.026	.026	-
20	.050	.266	.037	.050	.037	.037	.037	.037	.037	.026	.026	-
21	.050	.266	.037	.037	.037	.037	.037	.037	.037	.026	.150	-
22	.050	.037	.037	.037	.037	.037	.037	.037	.037	.026	.043	-
23	.050	.037	.211	.037	.037	.037	.037	.037	.037	.026	.026	-
24	.050	.037	.211	.037	.037	.037	.037	.037	.037	.026	.026	-
25	.465	.037	.211	.037	.037	.037	.037	.037	.037	.026	.026	-
26	.465	.037	.211	.037	.037	.037	.037	.037	.037	.026	.026	-
27	.050	.037	.139	.037	.037	.037	.037	.037	.037	.026	.026	-
28	.050	.037	.139	.037	.037	.037	.037	.037	.037	.026	.026	-
29	.050		.139	.037	.037	.037	.037	.037	.037	.026	.026	-
30	.050		.139	.037	.037	.037	.037	.037	.037	.026	.026	-
31	.050		.099		.037		.037	.037		.026		-
MIDDEL	.142	.099	.087	.045	.037	.037	.037	.037	.037	.028	.030	-
MAX	.465	.266	.211	.081	.037	.037	.037	.037	.037	.037	.150	-
MIN	.037	.037	.037	.037	.037	.037	.037	.037	.037	.026	.026	-

DAILY MEANS (M³/S)

STATION: WIPANGA
MAIN RIVER: KANANTUMBI
RIVER: LUICHE

DATE: 89/01/27.
YEAR: 1984

CATCHMENT AREA: 5.69 KM2

DATO	JAN	FEB	MAR	APR	MAI	JUN	JUL	AUG	SEP	OKT	NOV	DES
1	.026	.037	.050	.037	.037	.026	.016	.016	.009	.009	.009	.050
2	.026	.037	.050	.037	.037	.026	.016	.016	.009	.009	.009	.050
3	.026	.037	.050	.037	.037	.026	.016	.016	.009	.009	.009	.050
4	.026	.037	.037	.037	.037	.026	.016	.016	.009	.009	.009	.050
5	.026	.037	.037	.037	.037	.026	.016	.016	.009	.009	.009	.050
6	.026	.037	.037	.037	.037	.026	.016	.016	.009	.009	.009	.050
7	.026	.037	.037	.037	.037	.026	.016	.016	.009	.009	.009	.037
8	.026	.037	.037	.037	.037	.026	.016	.016	.009	.009	.009	.037
9	.026	.037	.037	.037	.037	.026	.016	.016	.009	.009	.009	.037
10	.026	.037	.037	.037	.031	.026	.016	.016	.009	.009	.009	.037
11	.037	.037	.037	.037	.026	.026	.016	.016	.009	.009	.009	.950
12	.050	.037	.037	.037	.026	.026	.016	.016	.009	.009	.009	.360
13	.050	.043	.037	.037	.026	.026	.016	.016	.009	.009	.043	.238
14	.050	.050	.037	.037	.026	.026	.016	.016	.009	.009	.050	.186
15	.037	.037	.037	.037	.026	.026	.016	.016	.009	.009	.037	.139
16	.037	.037	.037	.037	.026	.026	.016	.016	.009	.009	.043	.081
17	.037	.037	.037	.037	.026	.026	.016	.016	.009	.009	.050	.081
18	.037	.037	.037	.037	.026	.026	.016	.016	.009	.009	.037	.081
19	.037	.037	.037	.037	.026	.026	.016	.016	.009	.009	.108	.081
20	.393	.037	.037	.037	.026	.016	.016	.016	.009	.009	.081	.050
21	.162	.037	.037	.037	.026	.016	.016	.016	.009	.009	.065	.050
22	.081	.037	.037	.037	.026	.016	.016	.016	.009	.009	.050	.050
23	.238	.037	.037	.037	.026	.016	.016	.016	.009	.009	.118	.050
24	.090	.037	.037	.037	.026	.016	.016	.016	.009	.009	.099	.050
25	.050	.037	.037	.037	.026	.016	.016	.016	.009	.009	.050	.050
26	.037	.037	.037	.037	.026	.016	.016	.016	.009	.009	.050	.050
27	.037	.043	.037	.037	.026	.016	.016	.016	.009	.009	.037	.050
28	.037	.050	.037	.037	.026	.016	.016	.016	.009	.009	.037	.050
29	.043	.050	.037	.037	.026	.016	.016	.016	.009	.009	.037	.050
30	.037		.037	.037	.026	.016	.016	.016	.009	.009	.081	.050
31	.037		.037		.026		.016	.016		.009		.050
MIDDEL	.060	.038	.038	.037	.029	.022	.016	.016	.009	.009	.039	.104
MAX	.393	.050	.050	.037	.037	.026	.016	.016	.009	.009	.118	.950
MIN	.026	.037	.037	.037	.026	.016	.016	.016	.009	.009	.009	.037

DAILY MEANS (M³/S)

STATION: WIPANGA
 MAIN RIVER: KANANTUMBI
 RIVER: LUICHE

DATE: 89/01/27.
 YEAR: 1986

CATCHMENT AREA: 5.69 KM²

DATO	JAN	FEB	MAR	APR	MAI	JUN	JUL	AUG	SEP	OKT	NOV	DES
1	-	-	-	-	-	-	.048	.036	.028	.022	.028	.019
2	-	-	-	-	-	-	.048	.036	.028	.022	.036	.019
3	-	-	-	-	-	-	.048	.036	.028	.022	.028	.044
4	-	-	-	-	-	-	.048	.036	.028	.022	.022	.044
5	-	-	-	-	-	-	.048	.036	.028	.022	.019	.032
6	-	-	-	-	-	-	.048	.036	.028	.022	.019	.048
7	-	-	-	-	-	-	.048	.036	.028	.022	.019	.044
8	-	-	-	-	-	-	.048	.036	.028	.022	.019	.044
9	-	-	-	-	-	-	.044	.036	.028	.022	.017	.048
10	-	-	-	-	-	-	.044	.036	.028	.022	.017	.044
11	-	-	-	-	-	-	.044	.036	.028	.022	.017	.044
12	-	-	-	-	-	-	.044	.036	.028	.022	.017	.048
13	-	-	-	-	-	-	.044	.036	.028	.022	.019	.044
14	-	-	-	-	-	-	.044	.032	.028	.022	.017	.048
15	-	-	-	-	-	-	.044	.032	.028	.022	.017	.044
16	-	-	-	-	-	-	.044	.032	.028	.019	.022	.094
17	-	-	-	-	-	-	.040	.032	.025	.019	.022	.063
18	-	-	-	-	-	-	.040	.032	.025	.019	.019	.081
19	-	-	-	-	-	-	.040	.032	.025	.017	.022	.088
20	-	-	-	-	-	-	.040	.032	.025	.019	.022	.058
21	-	-	-	-	-	-	.040	.032	.025	.019	.019	.069
22	-	-	-	-	-	-	.040	.032	.025	.019	.019	.063
23	-	-	-	-	-	-	.040	.032	.025	.017	.022	.053
24	-	-	-	-	-	-	.040	.032	.025	.025	.022	.053
25	-	-	-	-	-	-	.040	.032	.025	.028	.017	.053
26	-	-	-	-	-	-	.040	.032	.025	.028	.044	.053
27	-	-	-	-	-	-	.040	.032	.022	.028	.022	.075
28	-	-	-	-	-	-	.040	.032	.022	.028	.044	.063
29	-	-	-	-	-	-	.040	.032	.022	.028	.201	.053
30	-	-	-	-	-	-	.040	.032	.022	.019	.170	.053
31	-	-	-	-	-	-	.040	.032		.028		.053
MIDDEL	-	-	-	-	-	-	.043	.033	.026	.022	.033	.052
MAX	-	-	-	-	-	-	.048	.036	.028	.028	.201	.094
MIN	-	-	-	-	-	-	.040	.032	.022	.017	.017	.019

DAILY MEANS (M³/S)

STATION: WIPANGA
 MAIN RIVER: KANANTUMBI
 RIVER: LUCHE

DATE: 89/01/27.

YEAR: 1987

CATCHMENT AREA: 5.69 KM2

DATO	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OKT	NOV	DES
1	.053	.075	.088	.075	.081	.058	.053	.044	.032	.053	.019	.019
2	.053	.075	.081	.081	.081	.058	.053	.044	.032	.048	.019	.019
3	.048	.094	.075	.069	.094	.058	.053	.044	.032	.053	.019	.019
4	.044	.075	.081	.069	.081	.058	.053	.044	.032	.053	.019	.019
5	.044	.058	.081	.094	.081	.058	.053	.044	.032	.040	.019	.019
6	.044	.088	.069	.094	.088	.058	.053	.044	.032	.044	.019	.019
7	.040	.058	.069	.094	.088	.058	.053	.044	.032	.032	.019	.019
8	.048	.069	.075	.088	.075	.058	.053	.044	.032	.044	.019	.028
9	.040	.117	.081	.094	.075	.058	.048	.048	.032	.053	.019	.040
10	.109	.117	.069	.081	.075	.058	.048	.048	.032	.044	.019	.036
11	.117	.075	.088	.075	.081	.058	.053	.044	.032	.048	.019	.040
12	.058	.075	.075	.075	.081	.058	.053	.044	.032	.044	.032	.036
13	.053	.075	.075	.081	.081	.053	.044	.044	.032	.040	.019	.036
14	.053	.075	.088	.075	.075	.053	.044	.044	.032	.048	.019	.040
15	.048	.075	.088	.081	.069	.058	.044	.044	.032	.048	.019	.040
16	.075	.101	.094	.069	.069	.058	.044	.036	.032	.044	.019	.019
17	.075	.109	.170	.075	.063	.058	.044	.036	.032	.032	.019	.019
18	.081	.125	.160	.094	.069	.058	.044	.036	.032	.019	.019	.019
19	.088	.069	.160	.081	.069	.058	.044	.036	.032	.019	.019	.019
20	.048	.142	.117	.081	.069	.058	.044	.036	.036	.019	.019	.019
21	.094	.125	.081	.081	.069	.058	.044	.036	.036	.019	.017	.019
22	.075	.160	.075	.081	.063	.058	.044	.036	.040	.019	.017	.022
23	.081	.170	.075	.081	.063	.053	.044	.036	.040	.019	.017	.022
24	.075	.125	.109	.094	.063	.053	.044	.036	.040	.019	.017	.019
25	.088	.151	.094	.088	.058	.048	.040	.036	.040	.019	.017	.019
26	.075	.094	.101	.088	.058	.048	.040	.036	.040	.019	.017	.019
27	.075	.069	.094	.117	.058	.053	.040	.036	.048	.019	.017	.019
28	.044	.117	.088	.088	.058	.053	.040	.036	.048	.019	.022	.019
29	.058		.075	.075	.058	.058	.040	.036	.048	.019	.019	.019
30	.151		.069	.075	.058	.058	.040	.036	.048	.019	.019	.019
31	.160		.094		.058		.040	.036		.019		.019
MIDDEL	.070	.098	.091	.083	.071	.056	.046	.040	.035	.033	.019	.023
MAX	.160	.170	.170	.117	.094	.058	.053	.048	.048	.053	.032	.040
MIN	.040	.058	.069	.069	.058	.048	.040	.036	.032	.019	.017	.019

DAILY MEANS (M³/S)

STATION: WIPANGA
 MAIN RIVER: KANANTUMBI
 RIVER: LUICHE

DATE: 89/01/27.
 YEAR: 1988

CATCHMENT AREA: 5.69 KM2

DATO	JAN	FEB	MAR	APR	MAI	JUN	JUL	AUG	SEP	OKT	NOV	DES
1	.025	.028	.028	.180	.040	.028	.022	.019	.014	.012	-	-
2	.025	.088	.028	.088	.040	.028	.022	.019	.014	.012	-	-
3	.025	.063	.028	.053	.040	.028	.022	.017	.014	.012	-	-
4	.022	.044	.022	.040	.040	.028	.022	.017	.014	.012	-	-
5	.022	.040	.022	.036	.036	.036	.022	.017	.014	.012	-	-
6	.022	.063	.025	.040	.036	.028	.022	.017	.014	.012	-	-
7	.022	.036	.025	.040	.032	.028	.022	.017	.014	.012	-	-
8	.022	.040	.028	.053	.036	.028	.022	.017	.014	.012	-	-
9	.025	.040	.032	.053	.036	.028	.022	.017	.014	.012	-	-
10	.028	.040	.032	.040	.040	.028	.022	.017	.014	.012	-	-
11	.028	.040	.032	.040	.040	.028	.022	.017	.014	.012	-	-
12	.028	.040	.036	.040	.036	.032	.022	.017	.014	.025	-	-
13	.025	.036	.028	.040	.036	.032	.022	.017	.014	.025	-	-
14	.025	.032	.028	.044	.040	.032	.022	.017	.014	.019	-	-
15	.025	.032	.028	.048	.036	.032	.022	.017	.014	.019	-	-
16	.019	.028	.075	.058	.040	.028	.022	.017	.014	.014	-	-
17	.019	.025	.069	.048	.036	.032	.019	.017	.014	.014	-	-
18	.019	.019	.063	.048	.036	.032	.019	.017	.014	.014	-	-
19	.036	.019	.088	.036	.036	.032	.019	.017	.014	.014	-	-
20	.058	.019	.109	.044	.040	.032	.019	.017	.014	.014	-	-
21	.048	.022	.101	.040	.040	.025	.019	.017	.014	.014	-	-
22	.036	.036	.058	.048	.040	.025	.019	.017	.014	.014	-	-
23	.170	.036	.036	.048	.028	.028	.019	.017	.014	.014	-	-
24	.036	.032	.094	.044	.028	.028	.019	.017	.014	.014	-	-
25	.032	.028	.040	.044	.028	.028	.019	.017	.014	.014	-	-
26	.025	.028	.053	.040	.028	.022	.019	.017	.014	.012	-	-
27	.022	.022	.048	.044	.028	.022	.019	.017	.014	.012	-	-
28	.040	.025	.088	.044	.028	.022	.019	.017	.014	.012	-	-
29	.028	.025	.094	.040	.028	.022	.019	.017	.014	.010	-	-
30	.028		.063	.040	.028	.022	.019	.017	.014	.010	-	-
31	.019		.063		.028		.019	.017		.010		-
MIDDEL	.032	.035	.050	.050	.034	.028	.020	.017	.014	.013	-	-
MAX	.170	.088	.109	.180	.040	.036	.022	.019	.014	.025	-	-
MIN	.019	.019	.022	.036	.028	.022	.019	.017	.014	.010	-	-

APPENDIX 2

Monthly discharges.

MONTHLY MEANS (M³/S)

CATCHMENT AREA: 625.00 KM²

OBSERVATIONS

[illegible]

88/09/30

DATA FOR PERIODEN 24/ 5 1975 -30/ 6 1988

STATION: USIA VILLAGE
 MAIN RIVER: LUICHE
 RIVER: LUICHE

MONTHLY MEANS

CATCHMENT AREA: 625.00 KM²

OBSERVATIONS

M3/S

	JAN	FEB	MARS	APRIL	MAI	JUNI	JULI	AUG	SEPT	OKT	NOV	DES	ARET	HYD.AR
MIDD	4.66	5.34	5.88	5.72	3.50	1.68	1.12	.76	.44	.30	.60	2.44	2.52	2.61
MAKS	22.04	13.86	16.36	12.22	6.29	3.16	2.39	1.68	1.13	.89	1.33	7.96	4.75	5.23
MIN	.80	1.55	1.93	2.85	1.83	.90	.53	.34	.16	.06	.17	.25	1.12	1.15
%	14.37	16.46	18.13	17.63	10.79	5.18	3.45	2.34	1.36	0.93	1.85	7.52		

L/S KM2

	JAN	FEB	MARS	APRIL	MAI	JUNI	JULI	AUG	SEPT	OKT	NOV	DES	ARET	HYD.AR
MIDD	7.46	8.55	9.41	9.16	5.60	2.69	1.79	1.22	.71	.47	.96	3.91	4.03	4.18
MAKS	35.26	22.17	26.17	19.55	10.07	5.05	3.83	2.69	1.80	1.10	2.13	12.74	7.59	8.37
MIN	1.28	2.48	3.09	4.56	2.93	1.45	.84	.54	.25	.10	.28	.40	1.79	1.84

CATCHMENT AREA: 6.36 KM²

OBSERVATIONS

[illegible]

88/12/01

DATA FOR PERIODEN 1/ 1 1981 - 1/11 1988

STATION: MUWA
 MAIN RIVER: LUICHE
 RIVER: LUICHE

MONTHLY MEANS

CATCHMENT AREA: 6.36 KM²

OBSERVATIONS

M3/S

	JAN	FEB	MARS	APRIL	MAI	JUNI	JULI	AUG	SEPT	OKT	NOV	DES	ARET	HYD.AR
MIDD	.03	.05	.05	.06	.05	.04	.03	.02	.02	.02	.02	.04	.04	.04
MAKS	.06	.10	.06	.09	.09	.06	.05	.03	.03	.03	.04	.07	.05	.05
MIN	.02	.02	.03	.03	.02	.02	.01	.01	.01	.02	.01	.01	.02	.02

L/S KM2

	JAN	FEB	MARS	APRIL	MAI	JUNI	JULI	AUG	SEPT	OKT	NOV	DES	ARET	HYD.AR
MIDD	4.87	7.70	7.39	8.96	7.39	5.66	4.56	3.46	2.99	2.99	3.62	6.45	5.97	5.50
MAKS	8.96	15.09	9.91	13.99	13.68	9.75	7.55	5.03	5.03	5.03	5.66	10.22	7.70	8.02
MIN	3.14	3.46	4.87	4.25	2.67	2.36	1.89	1.42	1.10	2.36	2.04	1.89	3.62	2.83

CATCHMENT AREA: 6.47 KM²

OBSERVATIONS

[illegible]

88/12/01

DATA FOR PERIODEN 10/ 4 1986 -31/10 1988

STATION: MOMOKA
 MAIN RIVER: MOMOKA
 RIVER: LUICHE

MONTHLY MEANS

CATCHMENT AREA: 6.47 KM²

OBSERVATIONS

M3/S

	JAN	FEB	MARS	APRIL	MAI	JUNI	JULI	AUG	SEPT	OKT	NOV	DES	ARET	HYD.AR
MIDD	.04	.05	.06	.06	.03	.03	.02	.02	.01	.02	.01	.03	.03	.03
MAKS	.05	.07	.08	.06	.04	.03	.02	.02	.02	.02	.02	.04	.03	.04
MIN	.03	.03	.04	.06	.03	.02	.02	.01	.01	.01	.01	.01	.03	.02

L/S KM2

	JAN	FEB	MARS	APRIL	MAI	JUNI	JULI	AUG	SEPT	OKT	NOV	DES	ARET	HYD.AR
MIDD	5.72	7.26	8.96	8.81	4.64	3.86	2.94	2.32	1.70	2.32	2.01	4.02	5.26	4.64
MAKS	7.57	10.51	12.52	9.27	6.18	4.79	3.25	2.94	2.32	3.40	2.47	6.49	5.26	5.87
MIN	3.86	4.17	5.41	8.50	3.86	3.25	2.63	1.85	1.55	1.70	1.70	1.55	5.26	3.55

89/01/27

MONTHLY MEANS (M³/S)

STATION: WIPANGA
MAIN RIVER: KANANTUMBI
RIVER: LUICHE

CATCHMENT AREA: 5.69 KM²

OBSERVATIONS

[illegible]

89/01/27

DATA FOR PERIODEN 11/ 3 1981 -31/10 1988

STATION: WIPANGA
 MAIN RIVER: KANANTUMBI
 RIVER: LUICHE

MONTHLY MEANS

CATCHMENT AREA: 5.69 KM²

OBSERVATIONS

M3/S

	JAN	FEB	MARS	APRIL	MAI	JUNI	JULI	AUG	SEPT	OKT	NOV	DES	ARET	HYD.AR
MIDD	.07	.07	.08	.07	.04	.03	.03	.03	.02	.02	.03	.07	.04	.05
MAKS	.14	.10	.13	.16	.07	.06	.05	.04	.04	.03	.04	.16	.06	.06
MIN	.03	.04	.04	.03	.03	.02	.02	.02	.01	.01	.02	.02	.04	.03

L/S KM2

	JAN	FEB	MARS	APRIL	MAI	JUNI	JULI	AUG	SEPT	OKT	NOV	DES	ARET	HYD.AR
MIDD	11.78	11.42	13.71	11.78	7.03	5.80	5.27	4.57	4.04	3.51	4.57	12.83	7.73	7.91
MAKS	24.96	17.40	22.32	27.24	12.48	9.84	8.08	7.03	6.50	5.80	6.85	27.94	9.67	10.54
MIN	5.45	6.15	6.68	5.62	4.57	3.69	2.81	2.81	1.58	1.58	2.81	4.04	6.15	5.45

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