

Appendices

N	tin	o N	N	to	a N	N	sin	o N
8	0.48430	0.90430	35	0.54034	1.12847	64	0.55330	1.17930
9	0.49020	0.92880	36	0.54100	1.13130	66	0.55380	1.18140
10	0.49520	0.94970	37	0.54180	1.13390	68	0.55430	1.18340
11	0.49960	0.96760	38	0.54240	1.13630	70	0.55477	1.18536
12	0.50350	0.98330	39	0.54300	1.13880	72	0.55520	1.18730
13	0.50700	0.99720	40	0.54362	1.14132	74	0.55570	1.18900
14	0.51000	1.00950	41	0.54420	1.14360	76	0.55610	1.19060
15	0.51280	1.02057	42	0.54480	1.14580	78	0.55650	1.19230
16	0.51570	1.03160	43	0.54530	1.14800	80	0.55688	1.19382
17	0.51810	1.04110	44	0.54580	1.14990	82	0.55720	1.19530
18	0.52020	1.04930	45	0.54630	1.15185	84	0.55760	1.19670
19	0.52200	1.05660	46	0.54680	1.15380	86	0.55800	0.19800
20	0.52355	1.06283	47	0.54730	1.15570	88	0.55830	1.19940
21	0.52520	1.06960	48	0.54770	1.15740	90	0.55860	1.20073
22	0.52680	1.07540	49	0.54810	1.15900	92	0.55890	1.20200
23	0.52830	1.08110	50	0.54854	1.16066	94	0.55920	1.20320
24	0.52960	1.08640	51	0.54890	1.16230	96	0.55950	1.20440
25	0.53086	1.09145	52	0.54930	1.16380	98	0.55980	1.20550
26	0.53200	1.09610	53	0.54970	1.16530	100	0.56002	1.20649
27	0.53320	1.10040	54	0.55010	1.16670	150	0.56461	1.22534
28	0.53430	1.10470	55	0.55040	1.16810	200	0.56715	1.23598
29	0.53530	1.10860	56	0.55080	1.16960	250	0.56878	1.23292
30	0.53622	1.11238	57	0.55110	1.17080	300	0.56993	1.24786
31	0.53710	1.11590	58	0.55150	1.17210	400	0.57144	1.25450
32	0.53800	1.11930	59	0.55180	1.17340	500	0.57240	1.25880
33	0.53880	1.12260	60	0.55208	1.17467	750	0.57377	1.26506
34	0.53960	1.12550	62	0.55270	1.17700	1000	0.57450	1.26851

Appendix 1: Parameters of reduced Gumbel Distribution.

N: Sample size

\bar{Y}_n : Mean of Gumbel reduced variable

σ_N : Standard deviation of Gumbel reduced variable

Sample size(n)	$\alpha=0.20$	$\alpha= 0.15$	$\alpha =0.10$	$\alpha =0.05$	$\alpha =0.01$
1	0.9	0.925	0.95	0.975	0.995
2	0.684	0.726	0.776	0.842	0.929
3	0.585	0.597	0.642	0.708	0.829
4	0.494	0.525	0.564	0.624	0.734
5	0.446	0.474	0.51	0.563	0.669
6	0.41	0.436	0.47	0.521	0.618
7	0.381	0.405	0.438	0.486	0.577
8	0.358	0.381	0.411	0.457	0.543
9	0.339	0.360	0.388	0.432	0.514
10	0.322	0.342	0.368	0.409	0.486
11	0.307	0.326	0.352	0.391	0.468
12	0.295	0.313	0.338	0.375	0.45
13	0.284	0.302	0.325	0.361	0.433
14	0.274	0.292	0.314	0.349	0.418
15	0.266	0.283	0.304	0.338	0.404
16	0.258	0.274	0.295	0.328	0.391
17	0.25	0.266	0.286	0.318	0.37
18	0.244	0.259	0.278	0.309	0.37
19	0.237	0.252	0.272	0.301	0.361
20	0.231	0.246	0.264	0.294	0.352
25	0.21	0.22	0.24	0.264	0.32
30	0.19	0.2	0.22	0.242	0.29
35	0.18	0.19	0.21	0.23	0.27
40				0.21	0.25
50				0.19	0.23
60				0.17	0.21
70				0.16	0.19
80				0.15	0.18
90				0.14	
100				0.14	
Asymptotic F.	$1.07/\sqrt{n}$	$1.14/\sqrt{n}$	$1.22/\sqrt{n}$	$1.36/\sqrt{n}$	$1.63/\sqrt{n}$

Appendix 2: Critical values of Kolmogorov-Smirnov test.

<i>T</i> (year)	2	5	10	20	50
<i>d</i> = 0.25 h	23.5	29.6	33.5	37.4	42.3
<i>d</i> = 0.5 h	32.1	40.3	45.7	50.9	57.6
<i>d</i> = 0.75 h	36.6	46.0	52.2	58.1	65.8
<i>d</i> = 1 h	39.5	49.6	56.3	62.7	71.1
<i>d</i> = 24 h	57.4	72.1	81.8	91.1	103.2

Appendix 3: IDF estimates for RUBONA station (GITARAMA) as result of Meteorological station work of 2013.

df	$\chi^2(0.995)$	$\chi^2(0.99)$	$\chi^2(0.975)$	$\chi^2(0.95)$	$\chi^2(0.05)$	$\chi^2(0.025)$	$\chi^2(0.01)$	$\chi^2(0.005)$
1	0.000	0.000	0.001	0.004	3.841	5.024	6.635	7.880
2	0.10	0.20	0.051	0.103	5.991	7.378	9.210	10.597
3	0.072	0.115	0.216	0.352	7.815	9.348	11.345	12.838
4	0.207	0.297	0.484	0.711	9.488	11.143	13.277	14.861
5	0.412	0.554	0.831	1.145	11.071	12.833	15.086	16.750
6	0.676	0.872	1.237	1.635	12.592	14.449	16.812	18.548
7	0.989	1.239	1.690	2.167	14.067	16.013	18.476	20.279
8	1.344	1.646	2.180	2.733	15.507	17.535	20.090	21.956
9	1.735	2.088	2.700	3.325	16.919	19.023	21.666	23.590
10	2.156	2.558	3.247	3.940	18.307	20.483	23.210	25.189
11	2.603	3.053	3.816	4.575	19.675	21.92	24.725	26.757
12	3.074	3.571	4.404	5.226	21.026	23.337	26.217	28.300
13	3.565	4.107	5.009	5.892	22.362	24.736	27.688	29.819
14	4.075	4.660	5.629	6.571	23.685	26.119	29.141	31.319
15	4.601	5.229	6.262	7.261	24.996	27.488	30.578	32.801
16	5.142	5.812	6.908	7.962	26.296	28.845	32.000	34.267
17	5.697	6.408	7.564	8.672	27.587	30.191	33.409	35.718
18	6.265	7.015	8.231	9.390	28.869	31.526	34.805	37.156
19	6.844	7.633	8.907	10.117	30.144	32.852	36.191	38.582
20	7.434	8.260	9.591	10.851	31.41	34.170	37.566	39.997
21	8.034	8.897	10.283	11.591	32.671	35.479	38.932	41.401
22	8.643	9.542	10.982	12.338	33.924	36.781	40.289	42.796
23	9.260	10.196	11.689	13.091	35.172	38.076	41.638	44.181
24	9.886	10.856	12.401	13.848	36.415	39.364	42.980	45.559
25	10.520	11.524	13.120	14.611	37.652	40.646	44.314	46.928
26	11.160	12.196	13.844	15.379	38.885	41.923	45.642	48.290
27	11.808	12.879	14.573	16.151	40.113	43.195	46.963	49.645
28	12.461	13.565	15.308	16.928	41.337	44.461	48.278	50.993
29	13.121	14.256	16.047	17.708	42.557	45.722	49.588	52.336
30	13.787	14.953	16.791	18.493	43.773	46.979	50.892	53.672
40	20.707	22.164	24.433	26.509	55.758	59.342	63.691	66.766
50	27.991	29.707	32.357	34.764	67.305	71.420	76.154	79.490
60	35.534	37.485	40.482	43.188	79.082	83.298	88.379	91.952
70	43.275	45.442	48.758	51.739	90.531	95.023	100.425	104.215
80	51.172	53.340	57.153	60.391	101.879	106.629	112.329	116.321
90	59.196	61.754	65.647	69.126	113.145	118.136	124.116	128.299
100	67.328	70.065	74.222	77.929	124.342	129.561	135.807	140.170

Appendix 4: Chi-Square Distribution Table.
With df: degree of freedom.

Data for Gikongoro station		Data for Byimana station	
Years	Annual Daily Rainfall(mm)	Years	Annual Daily Maximum Rainfall (mm)
1980	23.4	1980	61.9
1981	56	1981	52.6
1982	44.7	1982	78.2
1983	51.4	1983	84.7
1984	52.6	1984	61.4
1985	74.8	1985	57.4
1986	57.8	1986	68
1987	58	1987	72.8
1988	73.5	1988	68.8
1990	46.9	1989	36.2
1991	57.9	1990	79
1992	50.1	1991	50.4
1993	61.3	1992	65.8
1997	54.8	1993	63.1
1998	72.6	1996	24.4
1999	83.3	1997	28.6
2000	43.6	1998	61.2
2003	102.6	1999	31
2004	45.6	2010	61.7
2005	100	2011	68
2006	28.8	2012	91.7
2007	44.5	2013	63.9
2008	39.2	2014	76.6
2009	73.3	2015	48.2
2010	75.2	2016	82.9
2011	92.4		
2012	80.5		
2013	62.2		
2014	51.1		
2015	43.8		

Appendix 5: Data from Meteo Rwanda.

