

Annual Hydrological Data Summary Outputs



Some Definition of terms (WMO No. 1203)

- **Period Average** – ave of at least 10 yrs starting 01 Jan of a year ending in “1”, e.g. 01 Jan 2021
- **Normals** – period ave of long period comprising of at least 3 consecutive 10-yr periods
- **Average (provisional average)** – mean of monthly values over any specified period of time (not necessarily ending in “1”)



Other terms (Civil & Environmental Engineering Dept., Colorado S.U.)

- **IDF – relationship between rain intensity, rain duration, & return period; curves are obtained thru frequency analysis**
- **Return period (or recurrence interval) – estimate of an event (e.g. flood or river flow) to occur**
- **Will a 100-year flood occur once every 100 years?**

A 100-yr flood does not happen only once in 100 years. 100-yr flood has a 1 % chance of occurring in any given year



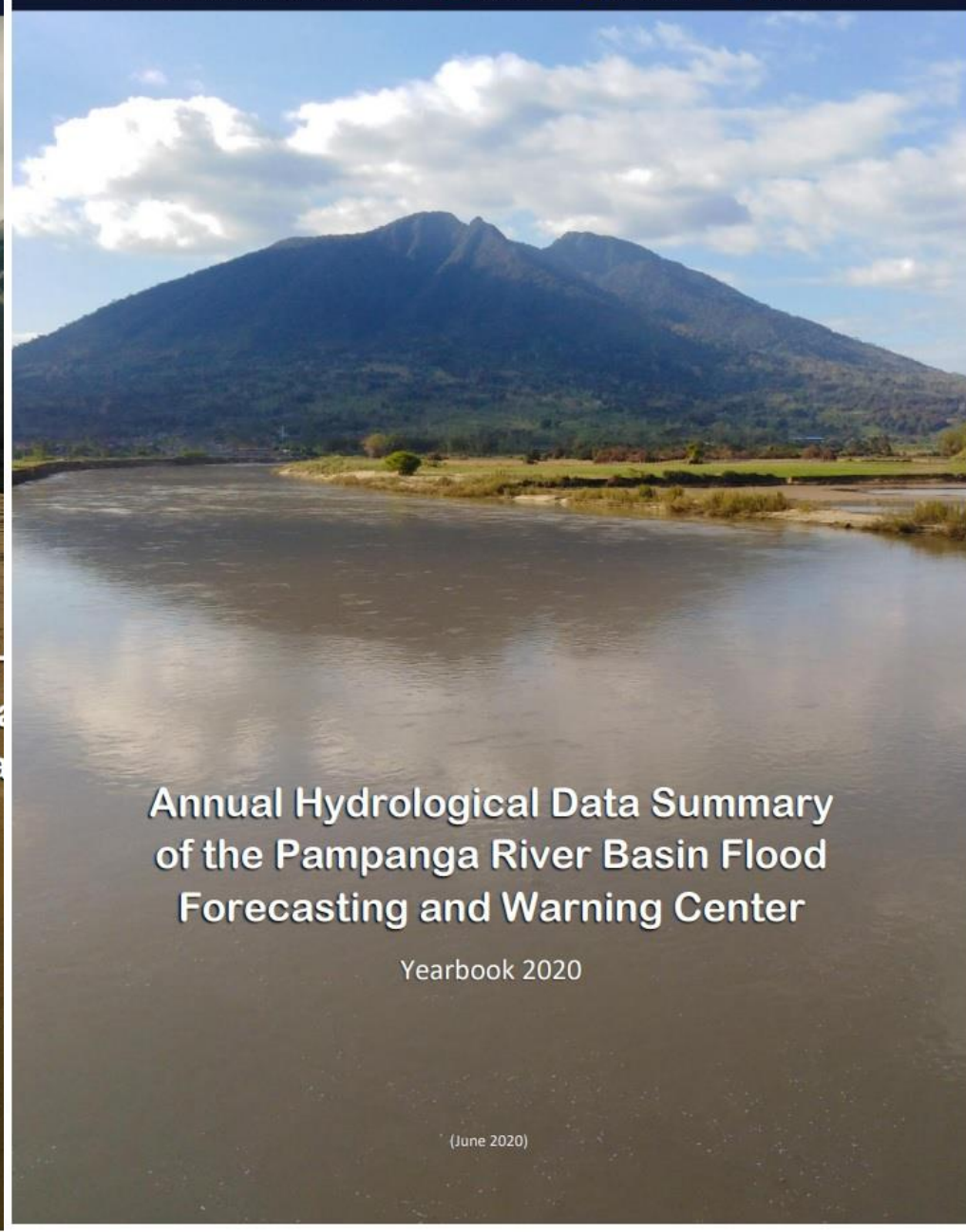
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Annual Hydrological Data Summary of the Pampanga River Basin Flood Forecasting and Warning Center

Yearbook 2020

(June 2020)

Daily Point Rainfall in millimeters

2018 Station: Sapang Buho

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0	0	0	0	0	0	1	27	26	26	0	0
2	0	0	0	0	0	0	8	31	36	1	0	0
3	0	0	0	0	0	0	3	33	48	16	0	0
4	0	0	0	0	0	0	0	27	6	0	0	2
5	0	0	0	0	2	5	13	8	3	0	0	0
6	0	0	0	0	0	58	1	0	20	0	0	0
7	0	0	0	0	0	0	18	6	15	0	0	0
8	0	0	0	0	38	2	5	21	1	0	0	0
9	0	0	0	0	0	9	1	13	30	0	0	0
10	0	0	0	0	0	7	0	4	13	0	0	0
11	0	0	0	0	0	17	12	41	0	0	0	0
12	0	0	0	0	0	1	6	22	21	0	0	0
13	0	0	0	0	0	28	7	14	0	0	0	0
14	0	0	0	0	0	23	5	7	84	0	0	0
15	0	0	0	0	0	12	0	4	53	2	0	0
16	6	0	0	0	0	0	15	49	3	0	0	0
17	1	0	0	0	0	5	10	46	0	0	0	0
18	5	0	0	0	0	0	43	2	0	0	0	0
19	0	0	0	0	0	1	73	4	0	0	0	0
20	0	0	0	0	0	71	52	32	2	2	0	0
21	0	0	0	0	0	6	79	7	0	0	0	7
22	0	0	0	0	0	5	16	9	0	0	0	5
23	0	0	0	0	0	1	1	8	0	0	0	25
24	0	0	0	0	27	2	6	7	0	0	0	0
25	0	0	0	0	1	3	30	4	1	0	0	0
26	6	0	0	0	7	9	22	15	0	0	0	0
27	0	0	0	0	0	12	33	0	0	0	0	0
28	0	0	0	0	0	0	49	0	0	0	0	5
29	0			0	0	0	0	0	0	6	0	6
30	0			0	0	3	16	0	0	105	0	0
31	0				0		20	19		2		13

Monthly Total	18	0	0	0	75	280	545	460	362	160	0	63
Average	0.58	0.00	0.00	0.00	2.42	9.33	17.58	14.84	12.07	5.16	0.00	2.03
Max daily rain	6	0	0	0	38	71	79	49	84	105	0	25
Day of Max Daily	16				8	20	21	16	14	30		23
No. of Rain days	4	0	0	0	5	21	27	26	16	8	0	7
Max 1-hr rain	3	0	0	0	31	40	43	24	31	18	0	6
Day of max 1-hr	26				8	7	21	3	3	30		21

Total rain for the year 1963
Total rain days for the year 114

Table 1.0

	Monthly Rainfall Summary for 2018														
PRB Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total for the year	Number of RR days	Max 24-hr RR (Met day)
Muñoz	8	0	17	59	142	353	648	423	386	243	0	29	2308	122	138
Sapang Buho	18	0	0	0	75	280	545	460	362	160	0	63	1963	114	105
Gabaldon	79	15	3	24	18	193	460	352	388	157	17	224	1930	149	135
Zaragoza	4	1	20	1	102	287	318	382	579	101	0	29	1824	102	77
Mayaypay															
Peñaranda	15	0	7	40	49	274	315	256	301	146	1	52	1456	112	85
Calaanan	42	0	3	6	4	410	768	526	336	160	17	64	2336	116	138
Palali	23	7	17	8	11	253	507	235	225	97	3	68	1454	130	81
San Isidro	10	3	37	44	92	187	257	229	317	169	1	48	1394	108	114
Arayat	10	0	45	7	62	350	438	458	343	148	20	40	1921	114	126
Candaba	19	0	16	0	51	60	322	392	248	150	26	69	1353	124	94
Sibul Spring	40	7	7	25	86	610	338	455	353	105	8	107	2141	129	189
Sasmuan	21	0	47	38	175	491	486	746	270	121	0	33	2428	104	148
Sulipan	26	1	6	8	70	369	526	404	169	104	1	27	1711	115	112
Mexico	15	0	26	8	42	93	418	494	251	134	0	19	1500	119	105
Porac	9	0	99	12	45	554	557	559	313	139	0	19	2306	112	129
San Rafael	43	6	22	0	118	367	420	510	282	156	11	95	2030	126	99
PRFFWC	14.0	0.0	39.6	58.7	62.0	348.0	463.0	522.5	367.8	129.8	2.3	37.3	2045.0	135	94.7

Mayaypay RR - out of order; no data for the whole year.

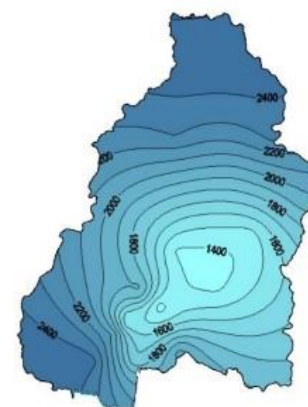


Figure 1a. The estimated Isohyet annual rainfall for year 2018 in the Pampanga River Basin

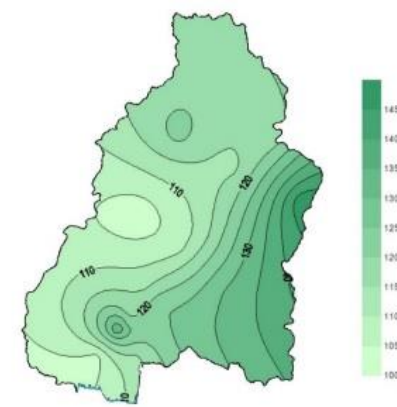


Figure 1b. Estimated rainfall days distribution (2018) in the Pampanga River Basin



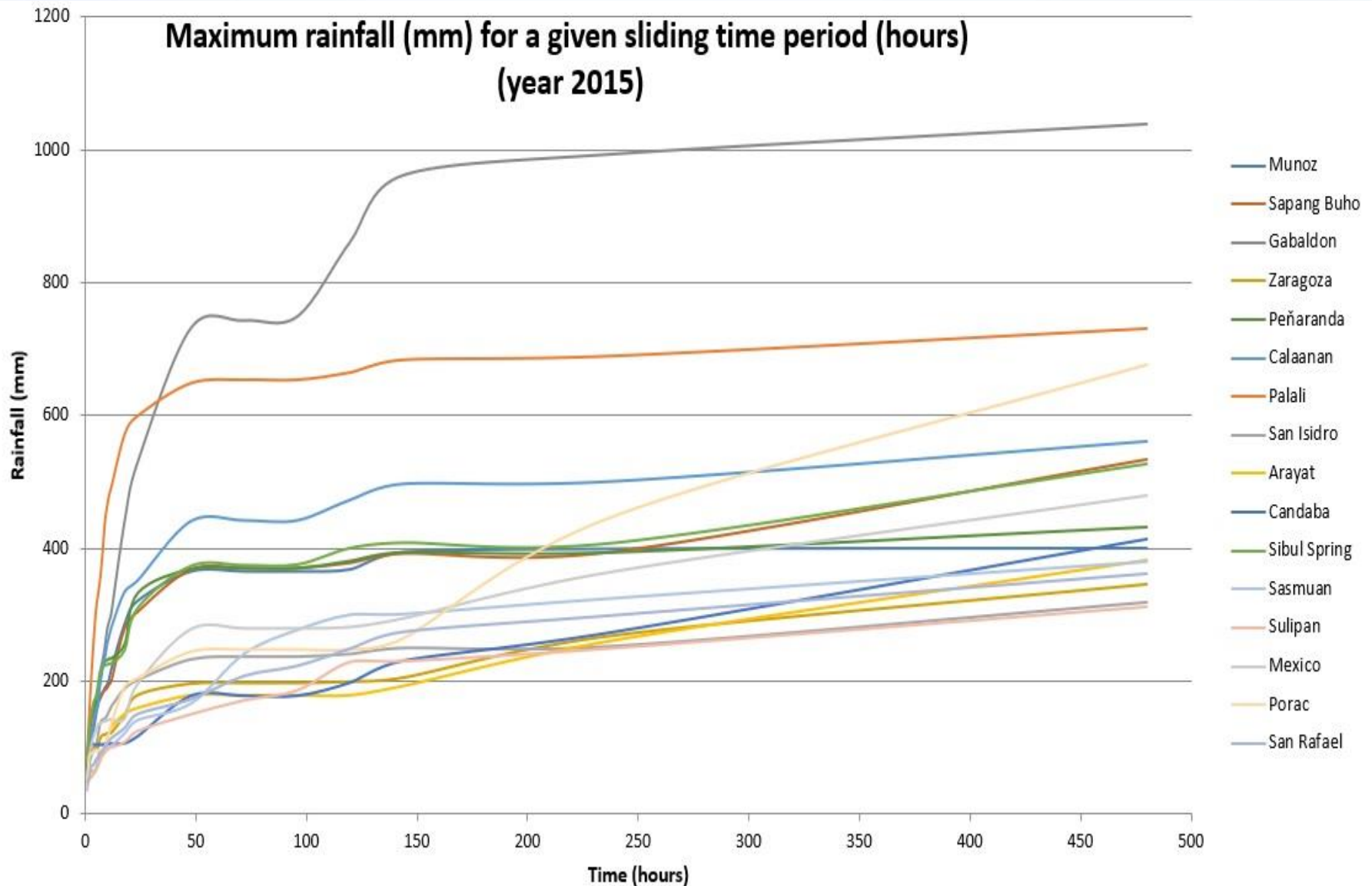
Sliding (unrestricted) max RR / time period

Maximum Rainfall for a given sliding time period during the year 2015

Sliding time period (minimum time period of 1 hour)	Rainfall Stations															
	Munoz	Sapang Buho	Gabaldon	Zaragoza	Peñaranda	Calaanan	Palali	San Isidro	Arayat	Candaba	Sibul Spring	Sasmuan	Sulipan	Mexico	Porac	San Rafael
1 hr	59	64	67	70	67	57	91	59	62	60	76	36	40	52	51	48
2 hrs	91	113	129	95	96	80	153	76	65	88	129	53	52	87	88	57
3 hrs	118	141	152	97	118	117	212	89	66	104	150	56	56	106	90	73
4 hrs	129	158	165	100	138	138	263	96	66	104	169	62	60	117	95	75
5 hrs	149	168	176	101	167	157	307	101	69	104	176	68	64	126	95	83
6 hrs	166	175	188	101	187	169	332	120	74	104	197	90	73	135	96	85
7 hrs	175	179	214	115	199	200	357	138	89	104	216	96	80	136	96	92
8 hrs	182	184	231	119	219	226	394	143	94	104	220	98	88	139	96	95
9 hrs	190	187	250	120	230	235	438	144	105	105	224	99	92	140	100	101
10 hrs	195	190	276	122	231	255	463	149	115	105	225	101	96	141	112	106
11 hrs	204	196	290	123	234	269	481	156	125	105	226	102	99	143	123	111
12 hrs	219	201	303	123	234	282	493	163	133	106	227	103	100	143	136	115
18 hrs	287	280	441	149	256	336	572	190	152	106	247	122	108	144	191	130
24 hrs	322	305	531	180	333	353	600	203	161	117	311	142	125	197	204	151
48 hrs (2 days)	366	368	732	197	369	442	649	234	180	178	374	167	150	279	244	173
72 hrs (3 days)	366	370	743	198	370	443	654	238	180	178	375	242	171	280	247	208
96 hrs (4 days)	366	370	749	198	370	443	654	238	180	178	376	278	186	280	247	223
120 hrs (5 days)	369	378	862	200	381	474	665	242	180	198	401	301	229	282	247	249
144 hrs (6 days)	395	392	962	206	394	498	684	251	194	231	409	302	230	295	264	274
240 hrs (10 days)	400	395	994	270	394	502	690	254	263	275	409	326	250	366	449	299
480 hrs (20 days)	401	533	1039	347	432	562	731	320	383	415	528	381	312	480	676	361
Meteorological day (8 am to 8 am)	227	225	395	139	255	273	362	175	138	106	276	105	111	144	199	114
Max monthly total	402	536	1047	394	403	568	731	390	400	416	619	436	338	494	743	447



Sliding (unrestricted) max RR / time period

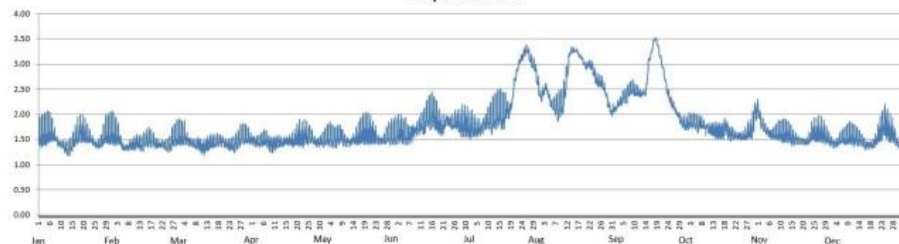


Water Level in meters (Daily Average)

2018	Station: Sulipan											
Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	1.58	1.61	1.55	1.49	1.47	1.62	1.77	2.35	2.09	1.79	2.02	1.47
2	1.56	1.57	1.54	1.45	1.50	1.67	1.73	2.46	2.17	1.80	1.83	1.44
3	1.60	1.54	1.55	1.44	1.52	1.64	1.75	2.54	2.22	1.84	1.74	1.42
4	1.61	1.48	1.51	1.45	1.53	1.63	1.72	2.40	2.28	1.84	1.68	1.44
5	1.62	1.43	1.49	1.45	1.52	1.62	1.71	2.31	2.31	1.83	1.66	1.47
6	1.61	1.34	1.43	1.49	1.50	1.57	1.72	2.18	2.37	1.77	1.61	1.53
7	1.57	1.34	1.41	1.47	1.55	1.60	1.74	2.14	2.45	1.83	1.61	1.52
8	1.51	1.36	1.39	1.43	1.58	1.69	1.83	2.10	2.50	1.80	1.62	1.53
9	1.44	1.39	1.41	1.40	1.53	1.68	1.87	2.15	2.48	1.77	1.63	1.56
10	1.41	1.41	1.37	1.41	1.49	1.71	1.87	2.20	2.45	1.75	1.61	1.56
11	1.38	1.44	1.34	1.43	1.46	1.79	1.85	2.46	2.45	1.72	1.61	1.54
12	1.33	1.43	1.35	1.47	1.45	1.75	1.94	2.86	2.41	1.69	1.62	1.52
13	1.31	1.40	1.40	1.44	1.48	1.85	1.96	3.18	2.43	1.67	1.61	1.50
14	1.34	1.42	1.42	1.44	1.50	1.93	2.04	3.26	2.44	1.66	1.59	1.49
15	1.41	1.48	1.43	1.47	1.51	1.97	1.99	3.27	2.84	1.65	1.53	1.45
16	1.51	1.49	1.43	1.47	1.54	2.01	1.98	3.26	3.13	1.65	1.50	1.39
17	1.58	1.48	1.45	1.47	1.61	1.94	2.12	3.18	3.34	1.68	1.50	1.39
18	1.63	1.46	1.46	1.46	1.63	1.88	2.07	3.13	3.48	1.73	1.49	1.39
19	1.63	1.42	1.47	1.49	1.64	1.80	2.13	3.02	3.40	1.66	1.48	1.40
20	1.61	1.40	1.44	1.52	1.64	1.74	2.38	2.96	3.21	1.61	1.46	1.45
21	1.56	1.39	1.40	1.55	1.63	1.80	2.71	2.99	3.00	1.60	1.46	1.54
22	1.52	1.40	1.38	1.54	1.59	1.87	2.91	2.97	2.77	1.58	1.50	1.62
23	1.49	1.37	1.38	1.58	1.56	1.85	3.05	2.86	2.51	1.57	1.59	1.71
24	1.44	1.37	1.39	1.58	1.50	1.80	3.13	2.72	2.36	1.58	1.64	1.83
25	1.40	1.40	1.42	1.56	1.48	1.82	3.23	2.64	2.23	1.56	1.61	1.75
26	1.40	1.47	1.48	1.52	1.48	1.84	3.27	2.64	2.16	1.58	1.63	1.67
27	1.45	1.53	1.54	1.47	1.49	1.81	3.15	2.58	2.05	1.62	1.63	1.63
28	1.53	1.56	1.56	1.44	1.56	1.76	3.03	2.47	1.99	1.65	1.61	1.57
29	1.61		1.54	1.44	1.54	1.80	2.96	2.26	1.88	1.70	1.56	1.47
30	1.62		1.53	1.46	1.57	1.77	2.76	2.12	1.83	2.00	1.53	1.42
31	1.63		1.50		1.58		2.51	2.07		2.04		1.49

Max WL observed	2.07	2.06	1.91	1.90	2.03	2.45	3.38	3.34	3.52	2.30	2.23	2.20
Day of Max WL	5	2	2	21	19	16	26	14	19	Nov 01	1	25

Sulipan WL 2018

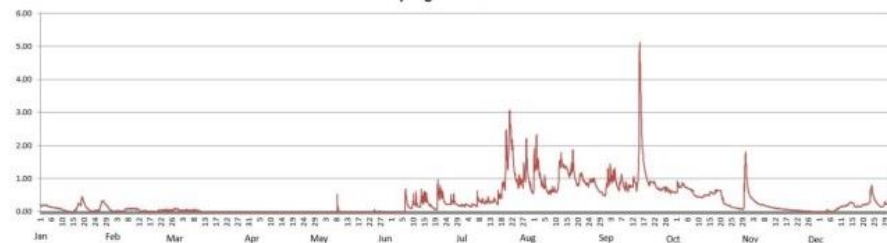


Water Level in meters (Daily Average)

2018	Station: Sapang Buho											
Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0.18	0.25	0.05	0.00	0.00	0.00	0.18	1.54	0.98	0.71	0.50	0.00
2	0.19	0.31	0.04	0.00	0.00	0.00	0.20	1.54	1.06	0.75	0.40	0.00
3	0.19	0.15	0.04	0.00	0.00	0.00	0.20	1.10	1.00	0.80	0.32	0.00
4	0.16	0.07	0.04	0.00	0.00	0.00	0.16	0.83	1.08	0.78	0.27	0.03
5	0.15	0.06	0.04	0.00	0.00	0.00	0.18	0.82	0.95	0.75	0.25	0.02
6	0.12	0.12	0.03	0.00	0.00	0.17	0.19	0.63	0.73	0.69	0.21	0.00
7	0.11	0.27	0.03	0.00	0.00	0.29	0.31	0.58	1.00	0.65	0.20	0.01
8	0.10	0.22	0.04	0.00	0.11	0.13	0.33	0.61	0.76	0.55	0.17	0.06
9	0.09	0.17	0.03	0.00	0.01	0.15	0.32	0.64	0.74	0.47	0.15	0.10
10	0.06	0.08	0.00	0.00	0.00	0.28	0.27	0.60	0.72	0.45	0.13	0.15
11	0.03	0.04	0.00	0.00	0.00	0.31	0.29	1.06	0.77	0.44	0.12	0.16
12	0.01	0.04	0.00	0.00	0.00	0.15	0.32	1.51	0.87	0.45	0.10	0.17
13	0.00	0.00	0.00	0.00	0.00	0.34	0.30	1.39	0.82	0.50	0.10	0.20
14	0.00	0.18	0.00	0.00	0.00	0.39	0.33	1.34	1.08	0.49	0.09	0.27
15	0.02	0.27	0.00	0.00	0.00	0.42	0.31	1.21	3.92	0.56	0.08	0.26
16	0.08	0.35	0.00	0.00	0.00	0.27	0.35	1.19	1.95	0.56	0.07	0.18
17	0.23	0.36	0.00	0.00	0.00	0.19	0.45	1.48	1.27	0.58	0.06	0.15
18	0.27	0.37	0.00	0.00	0.00	0.12	0.79	1.06	0.97	0.64	0.06	0.15
19	0.34	0.35	0.00	0.00	0.00	0.08	1.15	0.82	0.85	0.64	0.05	0.17
20	0.17	0.35	0.00	0.00	0.00	0.48	1.68	0.98	0.89	0.48	0.04	0.21
21	0.09	0.35	0.00	0.00	0.00	0.58	2.61	1.08	0.86	0.28	0.04	0.22
22	0.03	0.35	0.00	0.00	0.00	0.50	2.03	0.92	0.73	0.21	0.03	0.24
23	0.01	0.35	0.00	0.00	0.00	0.30	1.25	0.83	0.69	0.18	0.02	0.61
24	0.02	0.35	0.00	0.00	0.02	0.22	0.92	0.85	0.66	0.15	0.01	0.52
25	0.03	0.35	0.00	0.00	0.00	0.22	0.92	0.94	0.71	0.13	0.01	0.32
26	0.08	0.35	0.00	0.00	0.01	0.31	0.89	0.95	0.68	0.11	0.01	0.22
27	0.29	0.40	0.00	0.00	0.00	0.33	1.05	0.80	0.65	0.10	0.00	0.16
28	0.27	0.35	0.00	0.00	0.00	0.23	1.46	0.66	0.60	0.08	0.00	0.16
29	0.19		0.00	0.00	0.00	0.18	1.07	0.59	0.60	0.08	0.00	0.25
30	0.10		0.00	0.00	0.00	0.19	0.71	0.52	0.58	1.28	0.00	0.23
31	0.04		0.00		0.00		0.73	0.56		0.85		0.55

Max WL observed	0.45	0.10	0.09	0.00	0.52	0.96	3.08	2.34	5.13	1.81	0.61	1.18
Day of Max WL	19	7	1		8	21	21	2	15	31	1	01, 2019

Sapang Buho WL 2018







Station: **Muñoz**

Monthly Point Rainfall (millimeters)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Total
2009			38.0	163.0	205.0	351.0	386.0	473.0	413.0	427.0	7.0	3.0	2466.0
2010	0.0	0.0	5.0	30.0	136.0	137.0	443.0	237.0	196.0	239.0	101.0	29.0	1553.0
2011	56.0	0.0	1.0	3.0	239.0	143.0	219.0	335.0	418.0	277.0	135.0	71.0	1897.0
2012	33.0	9.0	23.0	6.0	238.0	335.0	376.0	482.0	258.0	113.0	15.0	5.0	1893.0
2013	0.0	4.0	11.0	85.0	69.0	244.0	336.0	554.0	366.0	99.0	35.0	6.0	1809.0
2014	0.0	0.0	20.0	78.0	97.0	183.0	410.0	247.0	401.0	209.0	29.0	46.0	1720.0
2015	14.0	0.0	0.0	0.0	157.0	191.0	315.0	253.0	365.0	402.0	4.0	401.0	2102.0
2016	9.0	0.0	1.0	26.0	242.0	105.0	255.0	496.0	157.0	492.0	49.0	17.0	1849.0
2017	14.0	20.0	7.0	16.0	247.0	219.0	255.0	297.0	105.0	78.0	175.0	4.0	1437.0
2018	8.0	0.0	17.0	59.0	142.0	353.0	648.0	423.0	386.0	243.0	0.0	29.0	2308.0
2019	36.0	0.0	0.0	24.0	161.0	185.0	249.0	493.0	335.0	88.0	161.0	24.0	1756.0
2020	0.0	1.0	5.0	6.0	184.0	159.0	175.0	304.0	316.0	491.0	118.0	138.0	1897.0

Annual Average (2010-2020) **1838.3**

Period Average (Jan 01, 2011 to Dec 31, 2020) **1866.8**

Monthly Average	15.5	3.1	10.7	41.3	176.4	217.1	338.9	382.8	309.7	263.2	69.1	64.4
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Monthly Rain Days

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Total
2009			4	10	12	21	27	18	23	12	1	1	129
2010	0	0	1	3	5	16	23	23	16	13	11	1	112
2011	3	0	1	2	11	15	22	19	20	16	8	8	125
2012	2	3	3	2	16	22	23	27	21	7	3	2	131
2013	0	1	2	5	12	15	17	20	24	8	6	3	113
2014	0	0	2	4	8	16	19	16	16	13	4	5	103
2015	1	0	0	0	12	11	20	19	18	9	2	7	99
2016	2	0	1	2	13	14	17	24	12	20	6	6	117
2017	3	1	1	2	11	14	17	18	15	10	7	2	101
2018	3	0	3	2	10	22	24	28	16	8	0	6	122
2019	2	0	0	4	12	12	18	24	21	7	9	5	114
2020	0	1	1	1	13	10	14	20	16	19	11	12	118

Annual Average (2010-2020) **114**

Period Average (Jan 01, 2011 to Dec 31, 2020) **114**

Monthly Average	1	1	2	3	11	16	20	21	18	12	6	5
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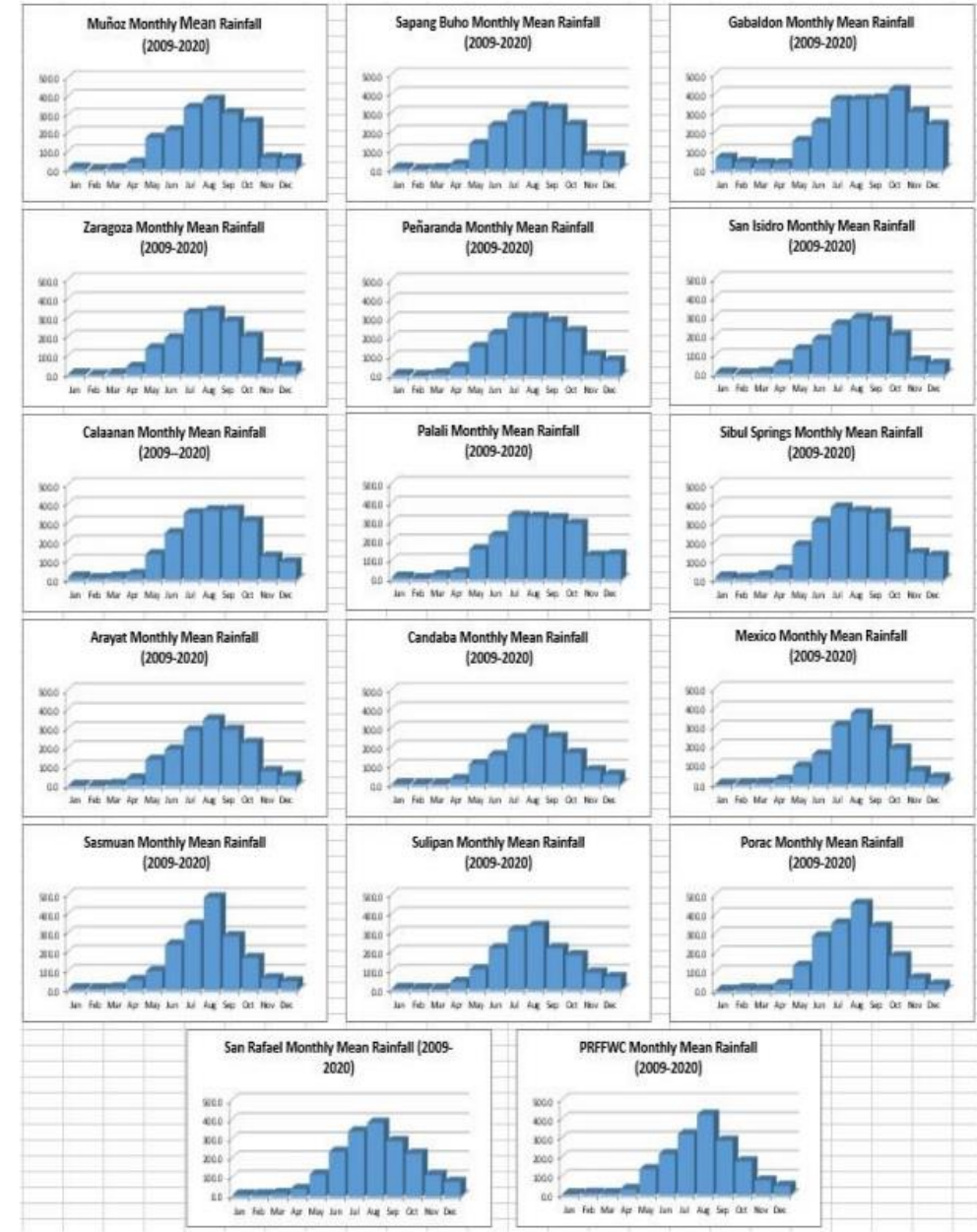


Figure 1. Monthly Mean Rainfall hyetograph of each rainfall station of PRFFWC (excluding Mayaypang station) within the Pampanga River Basin covering the years 2009 to 2020.

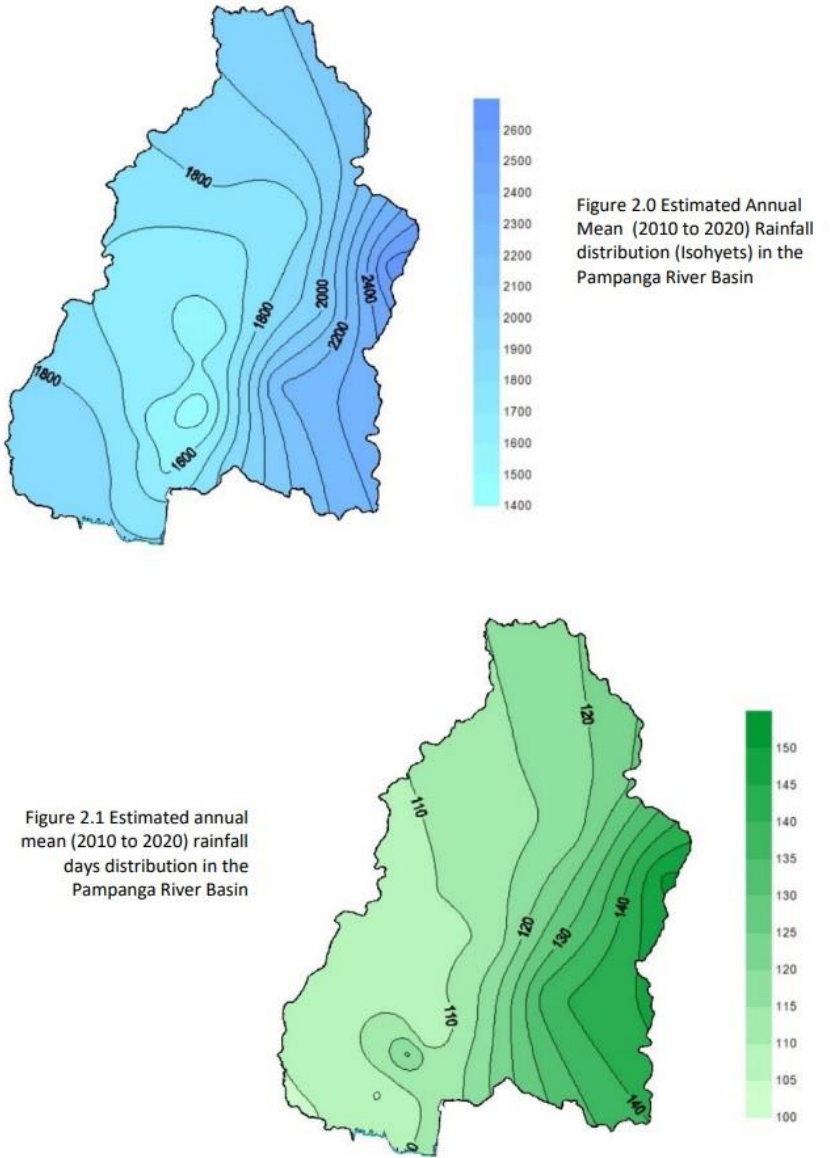


Figure 2.1 Estimated annual mean (2010 to 2020) rainfall days distribution in the Pampanga River Basin

PRFFWC Rainfall (station) IDF Curves

Muñoz Telemetry Stn.

		Return Period in years & Rainfall in mm/hr						
hrs	mins	2	5	10	25	50	100	200
1	60	61.39	76.07	85.79	98.07	107.18	116.22	125.23
2	120	39.46	49.10	55.48	63.54	69.52	75.46	81.38
3	180	28.32	35.32	39.95	45.81	50.15	54.46	58.76
6	360	16.03	20.96	24.23	28.36	31.42	34.46	37.49
12	720	9.99	13.62	16.03	19.07	21.32	23.56	25.79
18	1080	7.25	10.07	11.94	14.30	16.05	17.79	19.52
24	1440	5.97	9.11	11.20	13.83	15.79	17.73	19.66

Based on 12 years of record 2009 to 2020

Muñoz Telemetry Stn IDF Curves

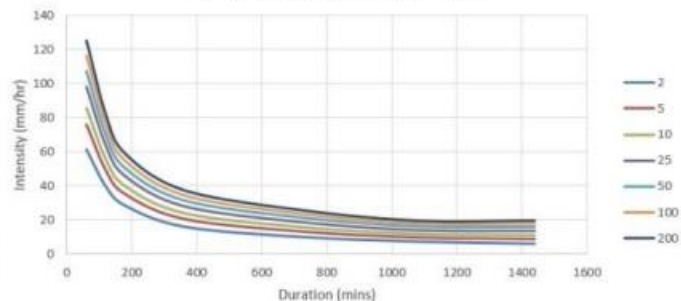


Figure 3.0

Sapang Buho Telemetry Stn.

		Return Period in years & Rainfall in mm/hr						
hrs	mins	2	5	10	25	50	100	200
1	60	51.14	64.47	73.29	84.44	92.71	100.92	109.10
2	120	33.03	42.76	49.20	57.34	63.38	69.37	75.35
3	180	25.11	33.87	39.68	47.01	52.45	57.85	63.24
6	360	14.72	20.52	24.36	29.21	32.81	36.38	39.94
12	720	8.85	13.12	15.95	19.52	22.17	24.80	27.42
18	1080	6.65	10.88	13.69	17.23	19.86	22.47	25.07
24	1440	5.44	8.80	11.03	13.84	15.92	17.99	20.05

Based on 12 years of record 2009 to 2020

Sapang Buho Telemetry Stn IDF Curves

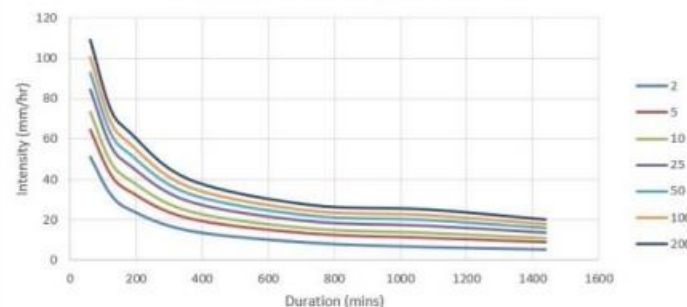


Figure 3.1

Gabaldon Telemetry Stn.

		Return Period in years & Rainfall in mm/hr						
hrs	mins	2	5	10	25	50	100	200
1	60	46.02	60.34	69.82	81.81	90.69	99.52	108.31
2	120	34.67	49.49	59.31	71.72	80.92	90.05	99.15
3	180	28.60	42.92	52.40	64.37	73.25	82.07	90.86
6	360	21.09	31.62	38.59	47.40	53.94	60.42	66.89
12	720	15.21	22.64	27.56	33.78	38.40	42.98	47.54
18	1080	12.52	19.71	24.48	30.50	34.96	39.40	43.81
24	1440	10.88	17.13	21.26	26.49	30.36	34.21	38.04

Based on 12 years of record 2009 to 2020

Gabaldon Telemetry Stn IDF Curves

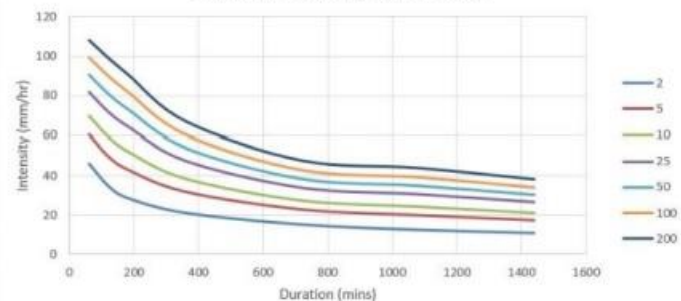


Figure 3.2

Zaragoza Telemetry Stn.

		Return Period in years & Rainfall in mm/hr						
hrs	mins	2	5	10	25	50	100	200
1	60	55.56	74.34	86.78	102.49	114.14	125.71	137.23
2	120	38.20	50.66	58.91	69.33	77.07	84.74	92.39
3	180	27.58	35.88	41.37	48.32	53.47	58.58	63.67
6	360	15.36	18.68	20.88	23.66	25.72	27.76	29.80
12	720	8.58	10.04	11.01	12.24	13.15	14.05	14.95
18	1080	6.18	7.63	8.59	9.80	10.70	11.59	12.48
24	1440	5.08	6.66	7.71	9.03	10.01	10.98	11.95

Based on 12 years of record 2009 to 2020

Telemetry Stn IDF Curves

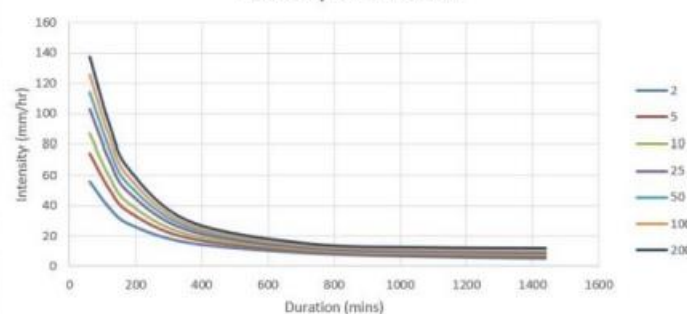


Figure 3.3

Station: **Zaragoza**

Monthly Average WL (meters) for indicated year

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Ave
2009			0.53	0.96	1.47	2.51	3.35	3.34	3.66	3.37	0.34	0.14	1.97
2010	0.35	0.26	0.31	0.17	0.09	0.27	3.02	2.55	2.36	1.84	1.11	0.34	1.06
2011	0.36	0.28	0.27	0.25	0.46	1.31	3.12	2.97	3.31	2.87	1.34	1.30	1.49
2012	0.59	0.56	0.66	0.21	0.08	1.79	3.61	3.98	3.06	1.64	0.43	0.11	1.39
2013	0.50	0.34	0.83	0.60	0.33	1.31	2.02	3.45	3.29	2.04	0.15	0.31	1.27
2014	0.54	0.38	0.42	0.21	0.07	0.74	2.17	1.62	2.83	1.59	0.31	0.35	0.94
2015	0.36	0.34	0.34	0.34	0.23	0.33	2.53	2.68	2.61	2.45	0.27	1.52	1.17
2016	1.11	1.08	0.94	1.04	1.11	1.30	1.12	2.54	2.29	1.84	0.22	0.35	1.24
2017	0.33	0.44	0.17	0.24	0.51	0.46	1.01	2.00	1.81	1.08	1.02	0.35	0.78
2018	0.42	0.25	0.20	0.29	0.37	1.24	3.10	3.18	3.47	2.43	1.76	1.44	1.51
2019	1.33	1.17	0.96	1.19	1.47	2.71	3.63	3.15	3.45	1.63	0.53	0.50	1.81
2020	0.27	0.15	0.23	0.22	0.97	0.50	1.03	2.29	1.55	2.86	2.08	0.63	1.06

Annual Average (2010-2020) 1.25

Monthly Average	0.56	0.48	0.49	0.48	0.60	1.21	2.48	2.81	2.81	2.14	0.80	0.61
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Monthly Maximum WL (meters)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Max
2009			1.03	2.46	3.22	3.75	4.27	4.45	4.18	5.47	1.42	0.37	5.47
2010	0.53	0.49	0.54	0.45	0.13	1.43	3.58	3.50	3.74	4.84	2.72	0.06	4.84
2011	1.67	0.82	0.68	0.57	1.81	4.67	4.50	4.26	5.21	5.18	2.93	2.21	5.21
2012	1.11	1.15	1.85	1.12	0.10	2.70	4.22	4.64	3.59	3.13	2.26	0.34	4.64
2013	0.84	0.67	1.31	1.04	1.14	2.68	3.33	4.32	3.88	3.34	0.40	0.73	4.32
2014	0.74	0.66	0.96	0.64	0.20	1.80	3.07	2.59	4.37	3.23	0.50	0.61	4.37
2015	0.69	0.35	0.38	0.43	0.81	0.35	4.63	4.21	4.11	4.25	0.89	5.22	5.22
2016	0.83	0.63	0.67	0.37	1.98	2.37	0.98	3.96	3.31	2.90	0.64	0.51	3.96
2017	1.03	1.53	0.53	0.44	1.81	1.72	2.48	2.96	2.66	3.06	2.76	0.63	3.06
2018	1.00	0.47	0.77	0.43	0.71	2.92	4.51	3.90	4.85	3.98	3.90	1.65	4.85
2019	2.44	1.45	1.18	2.59	2.05	4.05	4.81	4.03	4.52	3.76	1.32	0.70	4.81
2020	0.56	0.36	0.47	0.40	2.30	1.20	2.67	3.12	3.28	4.32	3.85	1.98	4.32

Rio Chico River at Zaragoza Station

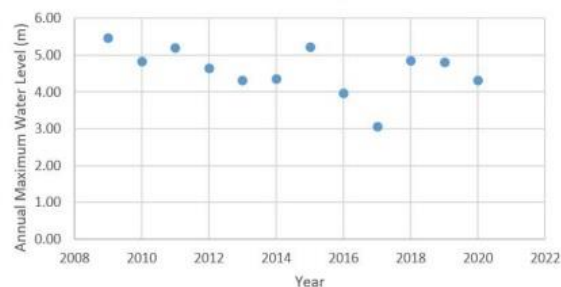


Figure 4.1

PRFFWC WL (station) Recurrence Interval

Sapang Buho

Stage Recurrence Interval Table

Year	Stage	Rank	Prob	R.I. (yrs)
2015	8.08	1	7.7	13.0
2011	7.17	2	15.4	6.5
2009	6.29	3	23.1	4.3
2020	5.89	4	30.8	3.3
2016	5.3	5	38.5	2.6
2013	5.26	6	46.2	2.2
2018	5.13	7	53.8	1.9
2014	4.54	8	61.5	1.6
2012	4.38	9	69.2	1.4
2017	4.07	10	76.9	1.3
2010	3.69	11	84.6	1.2
2019	2.94	12	92.3	1.1

Pampanga River at Sapang Buho stn. (2009-2020 dataset)

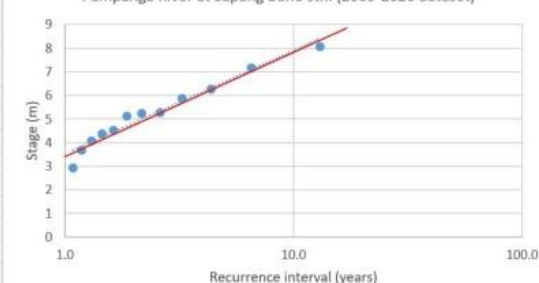


Figure 5.0

Zaragoza

Stage Recurrence Interval Table

Year	Stage	Rank	Prob	R.I. (yrs)
2009	5.47	1	7.7	13.0
2015	5.22	2	15.4	6.5
2011	5.21	3	23.1	4.3
2018	4.85	4	30.8	3.3
2010	4.84	5	38.5	2.6
2019	4.81	6	46.2	2.2
2012	4.64	7	53.8	1.9
2014	4.37	8	61.5	1.6
2013	4.32	9	69.2	1.4
2020	4.32	10	76.9	1.3
2016	3.96	11	84.6	1.2
2017	3.06	12	92.3	1.1

Rio Chico River at Zaragoza stn. (2009 to 2020 dataset)

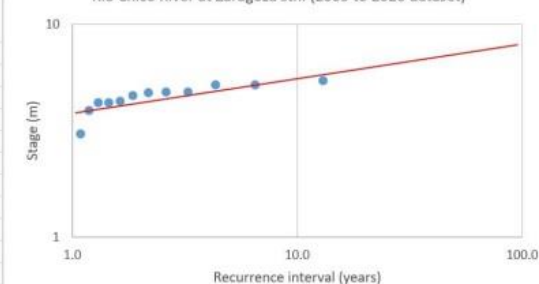


Figure 5.1

Peñaranda

Stage Recurrence Interval Table

Year	Stage	Rank	Prob	R.I. (yrs)
2015	7.63	1	7.7	13.0
2013	6.69	2	15.4	6.5
2011	6.01	3	23.1	4.3
2020	4.02	4	30.8	3.3
2016	3.08	5	38.5	2.6
2009	3.03	6	46.2	2.2
2012	3.00	7	53.8	1.9
2014	2.87	8	61.5	1.6
2017	2.79	9	69.2	1.4
2018	2.79	10	76.9	1.3
2010	2.57	11	84.6	1.2
2019	2.23	12	92.3	1.1

Peñaranda River station (2009 to 2020 dataset)

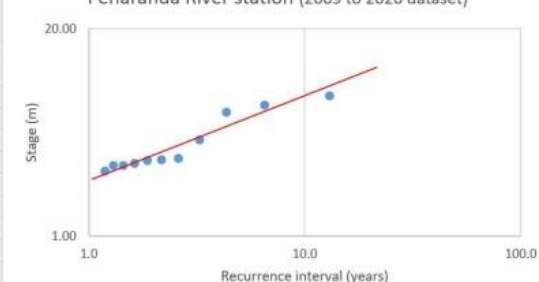


Figure 5.2

Thank you very much



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