

**REPORT ON DROUGHT CONDITION
FOR
PENINSULAR MALAYSIA
(BASED ON HYDROLOGICAL ANALYSIS)**

October 21, 2005

**Hydrology and Water Resources Division
Department of Irrigation and Drainage
Malaysia**

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**Report on Drought Condition for Peninsular Malaysia
(Based on Hydrological Analysis)
21 October 2005**

Summary

1. Analysis done on 41 stations shows slight increase on the monthly rainfall average for September which is 142.39mm compared to 141.1mm for the previous month.
2. On analyzing the three months total (July, August and September), 19 stations record above average while 22 stations are below average with percentage deviation ranging from -3 to -58%.
3. By comparing the three months total (434.8 mm) to the long term three month average (526.8 mm), it deviates further to -17.5% from -12.6% for the previous month.
4. Based on river flow analysed for the month of October, 2005, one out of ten rivers being monitored on-line still experiencing low flow condition as shown in table below.

No	Name of river	Low flow reading (cubic meter)	ARI (years)
1.	Sg. Bernam @ SKC Bridge	13	< 5

5. Most dam level being monitored online as on October 21 is improving (all above alert level), except Macap which is below the alert level by 0.41m.

No.	Name of dam being monitored	Present Storage (MCM) as on October 21	Percentage of September 22 storage as compared to its full capacity	Percentage of present storage (October 21) as compared to its full capacity
1.	Machap	5.03	41.90	48.09

1.0 Drought Monitoring by Rainfall Data

1.1 From the total of rainfall for the three consecutive months from July to September recorded at 151.30mm, 141.10mm and 142.39mm respectively, it can be deduced that the drought condition to some extent does not significantly improve. The rainfall data is then used to produce the isohyetal map Figure 1.1, 1.2, 1.2 A and 1.2 B (also shown in the drought websites below)

:

- i. <http://infokemarau/DrIsohyet.html>
- ii. http://infokemarau/monthly_rainfall1.html
- iii. http://infokemarau/dranalysis_2005.html

**Figure 1.1 : ISOHYET OF RAINFALL DEVIATION FROM LTM
FOR THE MOVING 3 MONTHLY RAINFALL OF JULY – SEPTEMBER 2005.**

MONTH : JULY 2005
PERIOD : MAY - JULY 2005

MONTH : OGOS 2005
PERIOD : JUN - OGOS 2005

MONTH : SEP 2005
PERIOD : JUL - SEP 2005

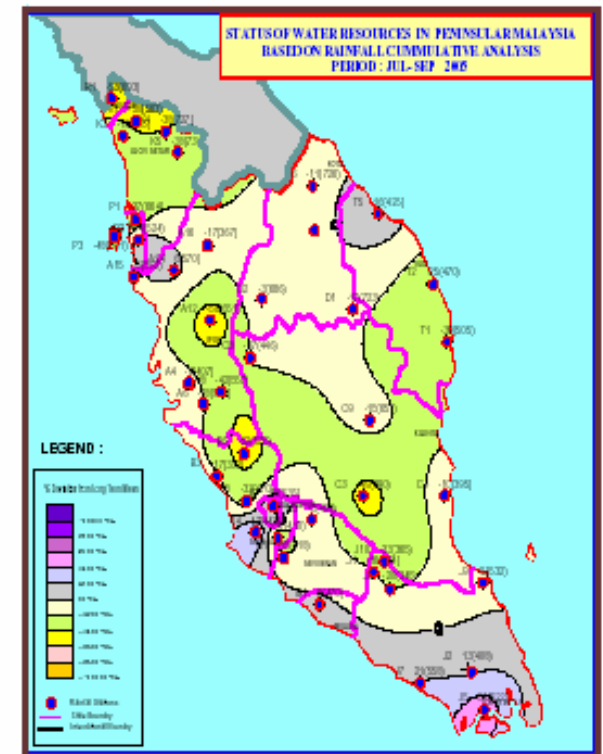
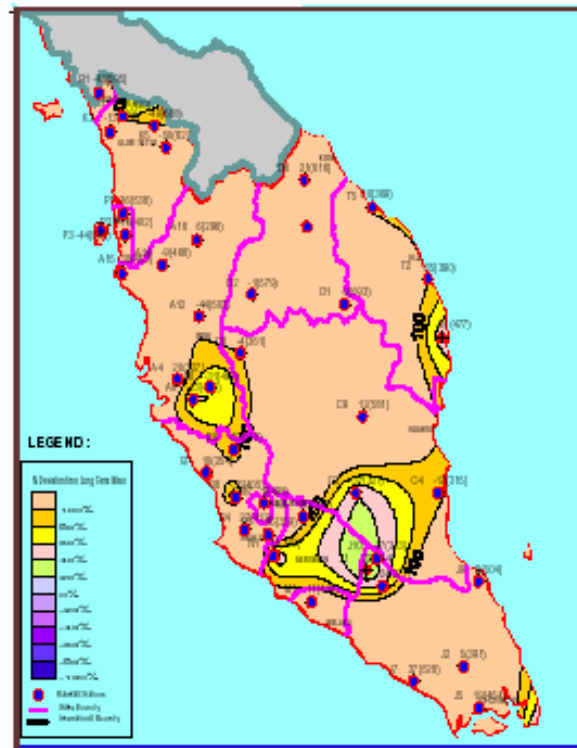
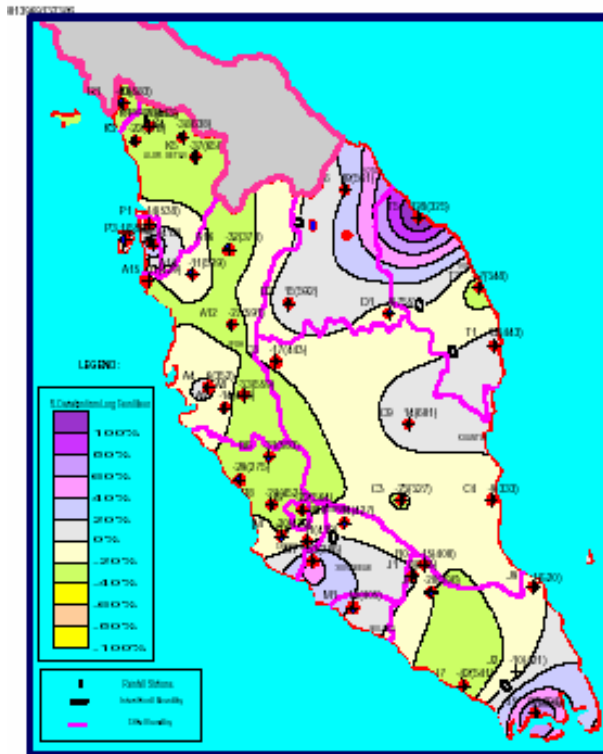
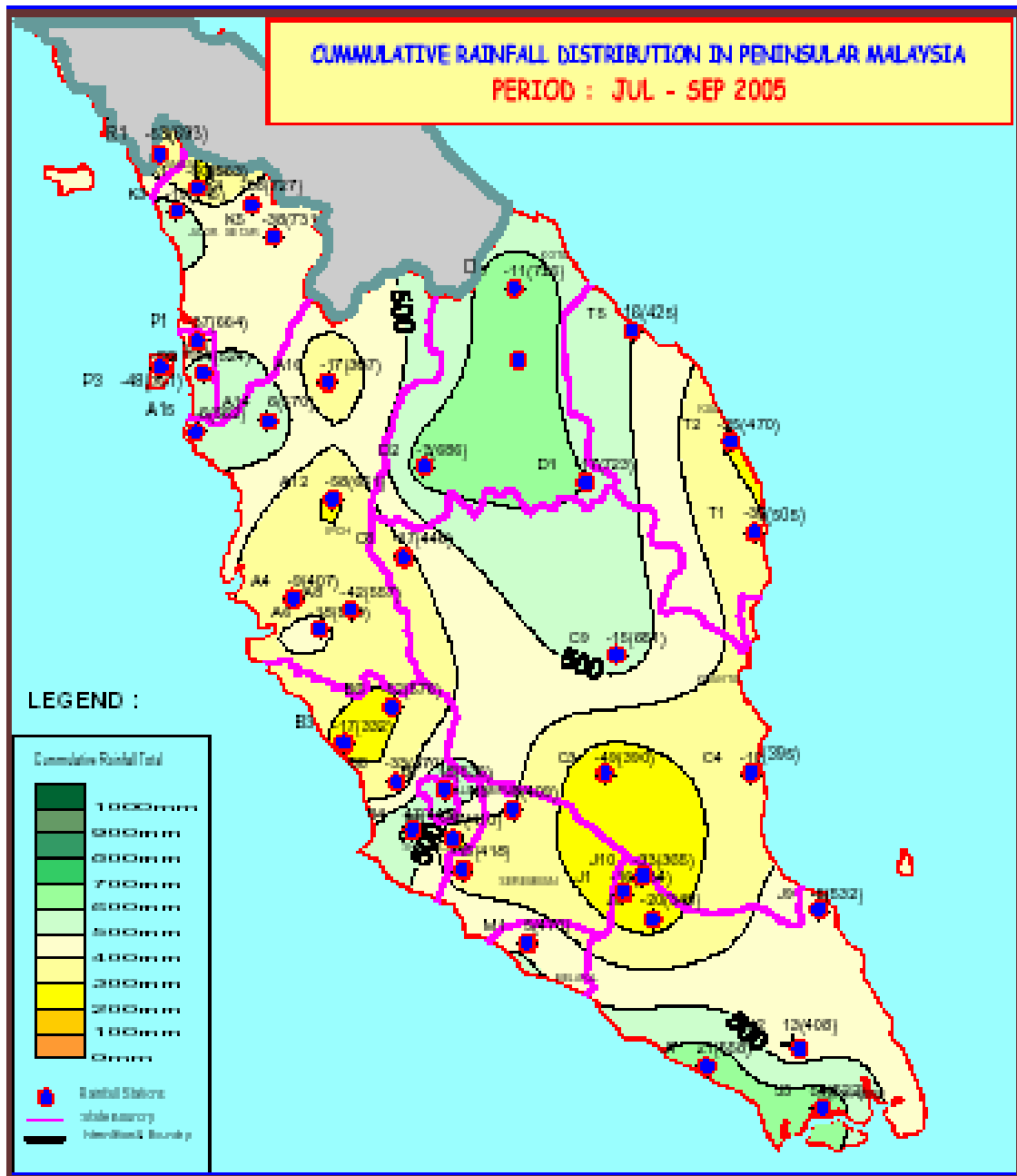


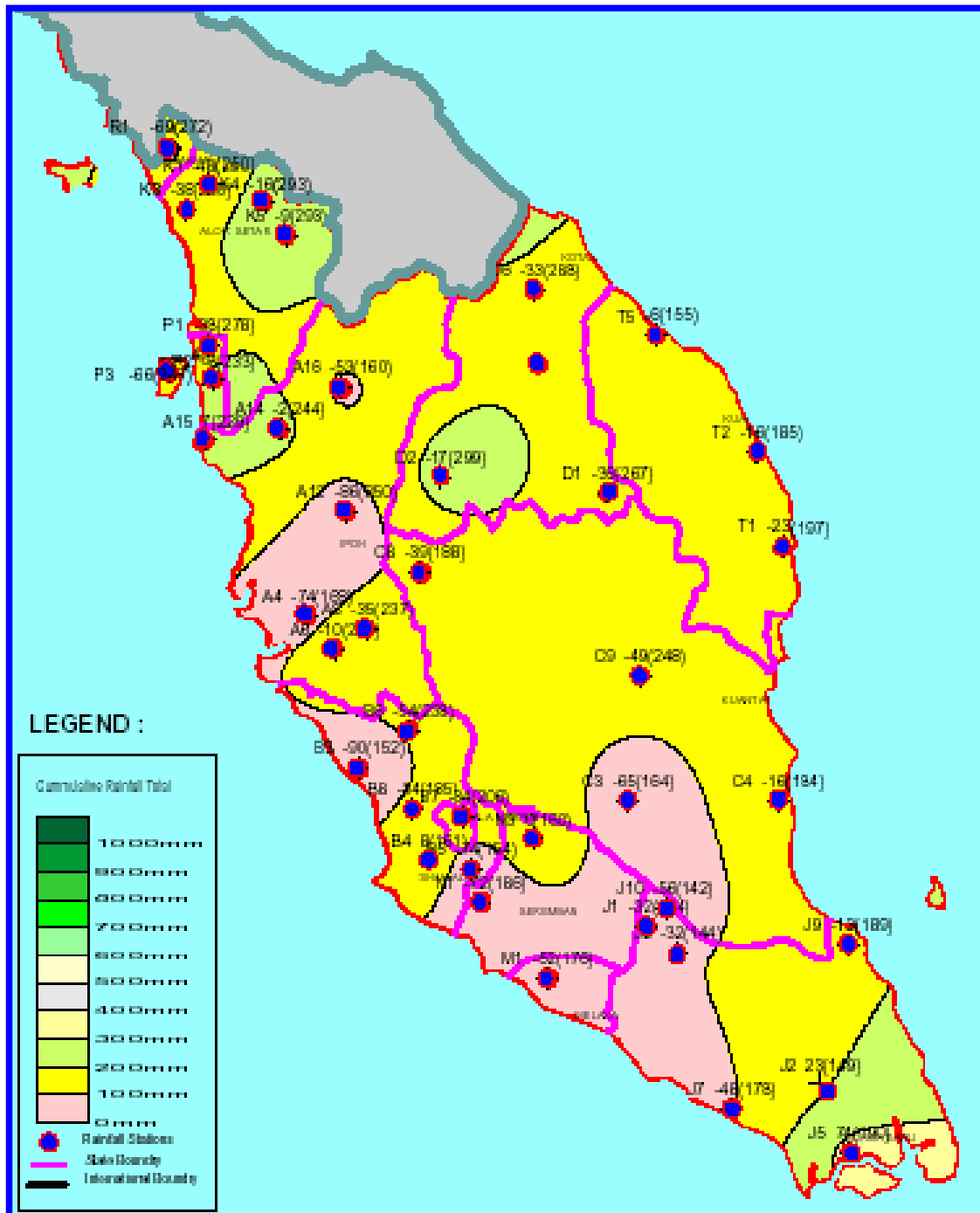
Figure 1.2 : ISOHYET OF TREE MONTHLY RAINFALL DISTRIBUTION

MONTH: SEPTEMBER 2005

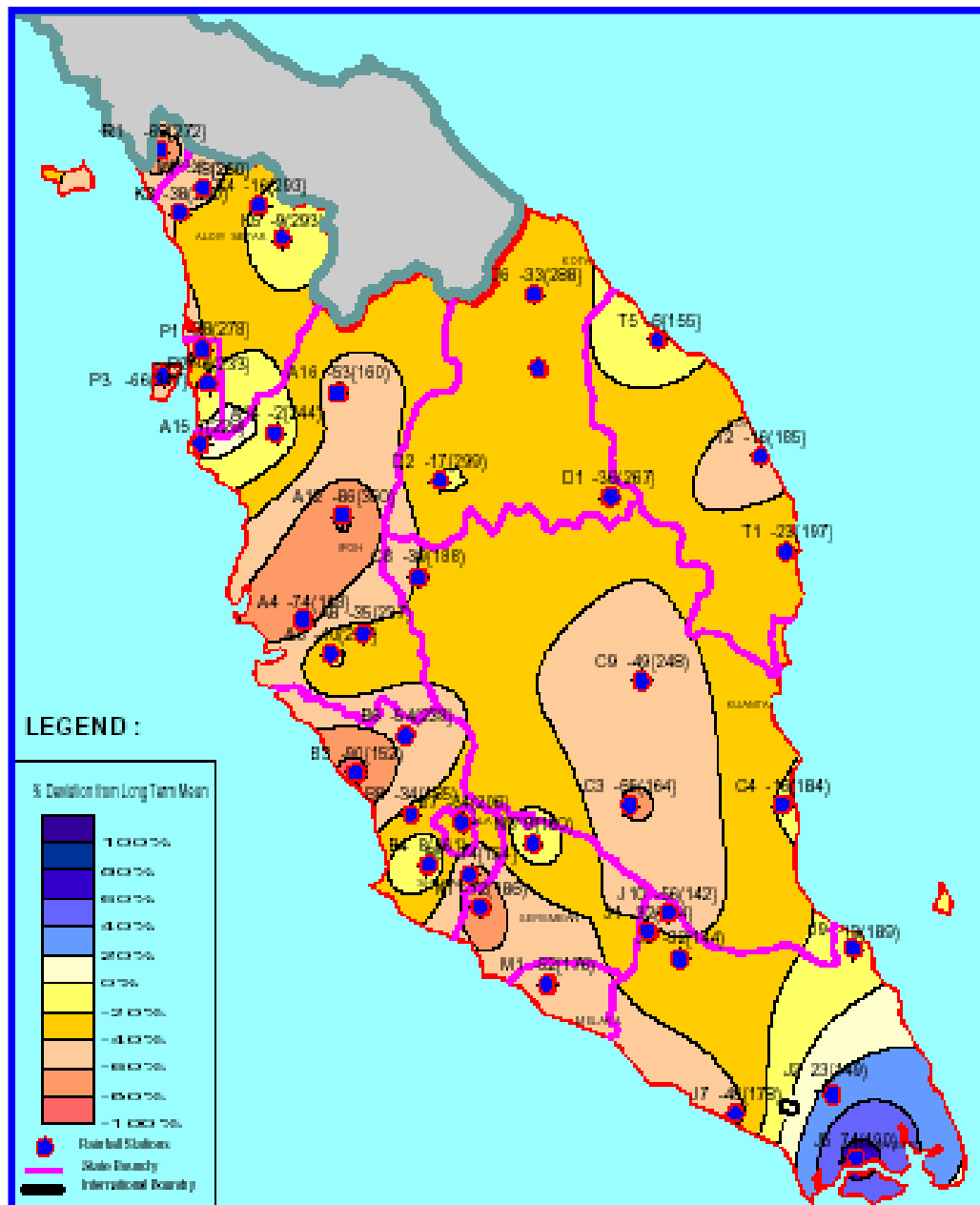
PERIOD: JULY – SEPTEMBER 2005



**Figure 1.2 A : ISOHYET OF MONTHLY RAINFALL STATUS 2005
FOR THE MONTH OF SEPTEMBER 2005**



**Figure 1.2 B : ISOHYET OF MONTHLY RAINFALL STATUS 2005
STANDARD DEVIATION FOR THE MONTH OF SEPTEMBER 2005**



1.3 For the state of Perlis, Kedah, Penang, Perak, Selangor and Pahang, the deficiency ranging from -3% to -58%. For East Coast states, Terengganu records the deficit of -25% to -39% while Kelantan is -3% to -17%. It shows that, the rainfall deficiency occurs to almost all states.

Table 1.1 : Rainfall Analysis for July – September 2005

NO	NO STESEN	JUL-05	Aug-05	Sep-05	Total Rainfall	(3Mth Cum Rf)	Diff(mm)	% Dev
1	6501005 (R1)	64.00	176.50	83.50	324.00	693.3	-369.3	-53
2	6206035 (K1)	92.00	61.00	130.00	283.00	562.8	-279.8	-50
3	6103047 (K3)	111.00	316.70	173.10	600.80	745.2	-144.4	-19
4	061 (K4)	94.70	106.50	246.50	447.70	727.0	-279.3	-38
5	566 (K5)	74.00	116.50	266.50	457.00	731.4	-274.4	-38
6	5505033 (P1)	106.00	141.00	173.50	420.50	664.5	-244.0	-37
7	5304045 (P2)	219.50	158.00	220.00	597.50	523.9	73.6	14
8	5302003 (P3)	143.50	136.00	117.50	397.00	761.4	-364.4	-48
9	4109095 (A4)	200.00	124.00	44.00	368.00	406.6	-38.6	-9
10	4011139 (A6)	184.50	57.50	194.50	436.50	529.7	-93.2	-18
11	4011144 (A8)	112.00	60.50	153.00	325.50	557.3	-231.8	-42
12	4511111 (A12)	120.50	104.00	48.50	273.00	651.5	-378.5	-58
13	5006021 (A14)	265.50	101.50	238.50	605.50	569.7	35.8	6
14	5003028 (A15)	119.00	163.50	245.50	528.00	562.4	-34.4	-6
15	5210069 (A16)	80.50	149.50	75.00	305.00	367.1	-62.1	-17
16	3411017 (B3)	89.50	172.50	14.50	276.50	331.6	-55.1	-17
17	2917001 (B4)	217.00	260.50	174.00	651.50	442.8	208.7	47
18	2818110 (B5)	68.00	149.00	40.00	257.00	409.9	-152.9	-37
19	3516022 (B6)	87.50	81.50	109.50	278.50	575.9	-297.4	-52
20	3117070 (B7)	157.02	342.50	135.10	634.62	536.4	98.2	18
21	3115079 (B8)	141.00	54.00	122.00	317.00	470.2	-153.2	-33
22	2719001 (N1)	258.00	45.00	51.50	354.50	418.1	-63.6	-15
23	3023098 (N3)	125.50	113.00	159.74	398.24	409.4	-11.1	-3
24	2321006 (M1)	273.50	134.50	85.00	493.00	470.3	22.7	5
25	2526001 (J1)	173.00	16.00	91.00	280.00	334.3	-54.3	-16
26	2033001 (J2)	137.00	142.00	182.50	461.50	408.2	53.3	13
27	1437116 (J5)	259.00	216.00	331.00	806.00	522.2	283.8	54
28	1829001 (J7)	145.50	437.00	92.00	674.50	557.9	116.6	21
29	2528002 (J8)	118.00	60.00	98.00	276.00	344.6	-68.6	-20
30	2536168 (J9)	135.50	204.00	164.00	503.50	531.9	-28.4	-5
31	2527004 (J10)	143.00	39.50	62.50	245.00	365.3	-120.3	-33
32	3424081 (C3)	103.50	40.00	57.00	200.50	389.6	-189.1	-49
33	3533102 (C4)	104.50	96.50	154.00	355.00	395.2	-40.2	-10
34	4414036 (C8)	158.00	99.00	115.00	372.00	446.2	-74.2	-17
35	3930012 (C9)	224.00	206.00	125.50	555.50	650.8	-95.3	-15
36	4726001 (D1)	209.00	222.00	170.00	601.00	723.4	-122.4	-17
37	4819027 (D2)	185.00	231.00	248.00	664.00	685.9	-21.9	-3
38	5921009 (D6)	244.50	208.00	194.50	647.00	725.8	-78.8	-11
39	4234109 (T1)	112.00	45.50	151.50	309.00	505.4	-196.4	-39
40	4734079 (T2)	94.50	102.50	154.50	351.50	469.6	-118.1	-25
41	5331048 (T5)	253.00	95.00	146.00	494.00	424.6	69.4	16
	MEAN	151.3	141.1	142.39	434.8	526.8	-92.0	-17.5

Special focus on Johor’s drought based on dam level and rainfall data

1.4 Figure 1.3 and 1.4, show rainfall records for the stations located near to the three dams being monitored i.e. Macap, Sembrong and Bekok. The rainfall data for these locations are improving. Stor Baru JPS Kluang records 6.8% and 6.2% in August and September respectively compared to their long term average. For Macap Dam, by having a deficit of –25.9% for October (reading for September 2005 is 29% above average), there is no indication or report on any occurrence of water shortage for the particular location.

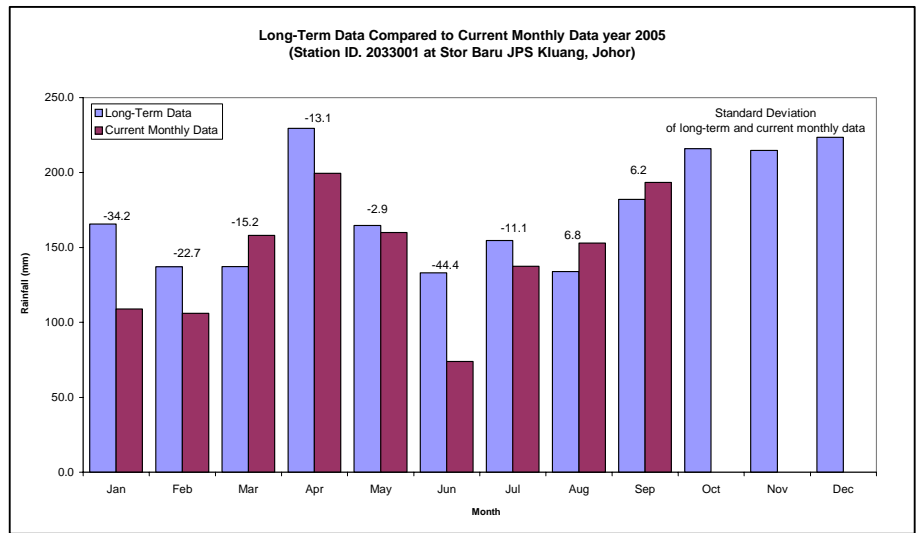


Figure 1.3: Long Term Data Compared to Current Monthly Data (year 2005)
At Stor Baru JPS Kluang, Johor.

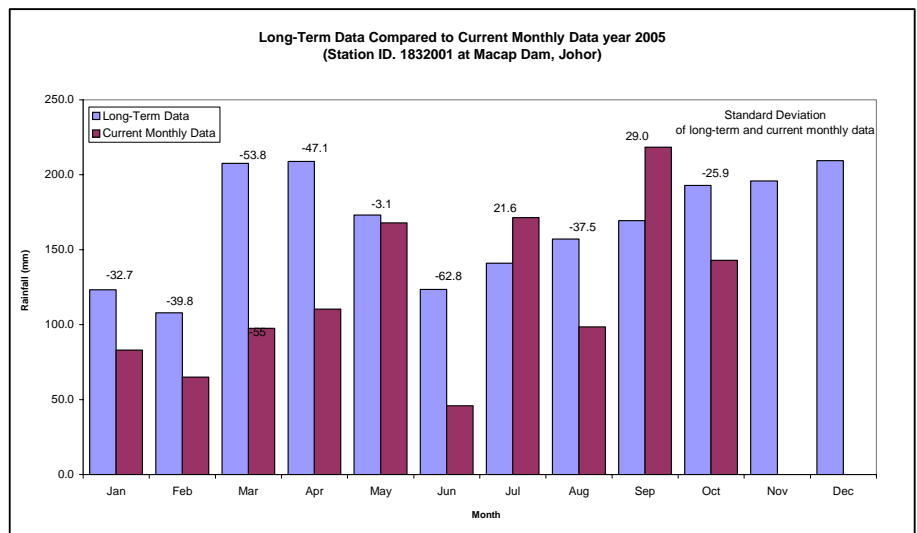


Figure 1.4 : Long Term Data Compared to Current Monthly Data (year 2005)
For Macap Dam, Johor.

Special focus to Negeri Sembilan's drought based on rainfall data

1.5 As large part of peninsular Malaysia having improved water supply, Seremban on the other hand still experiencing water shortage where water rationing is practiced through out Seremban town.

Based on three rainfall stations near to Sungai Terip catchment (refer to Figure 1.5, 1.6 and 1.7) there is serious indication of rainfall deficit in October 2005 ranging from -13% to -72.3% (compared to its long term average). The rainfall deficit for October 2005 is more serious compared to July and August 2005. This would probably suggest the cause of water shortage experienced in Seremban as there was not much rainfall being recorded over the Sg. Terip catchment which is main the source of water supply for large part of Seremban town.

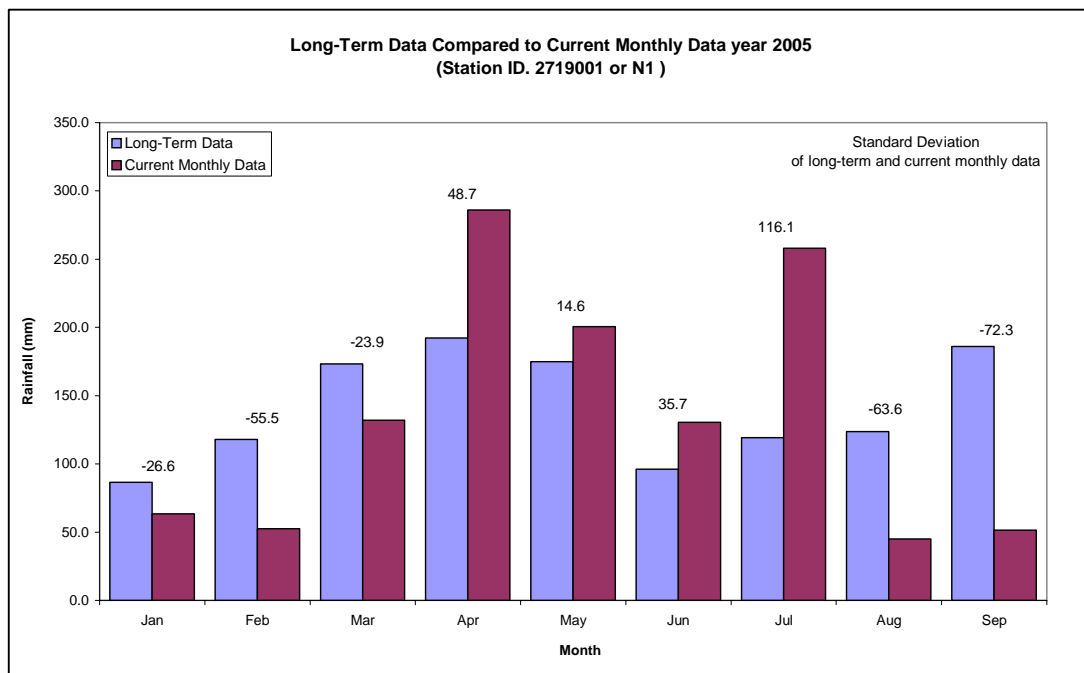


Figure 1.5 : Long-Term Data Compared to Current Monthly Data (year 2005) in Negeri Sembilan.

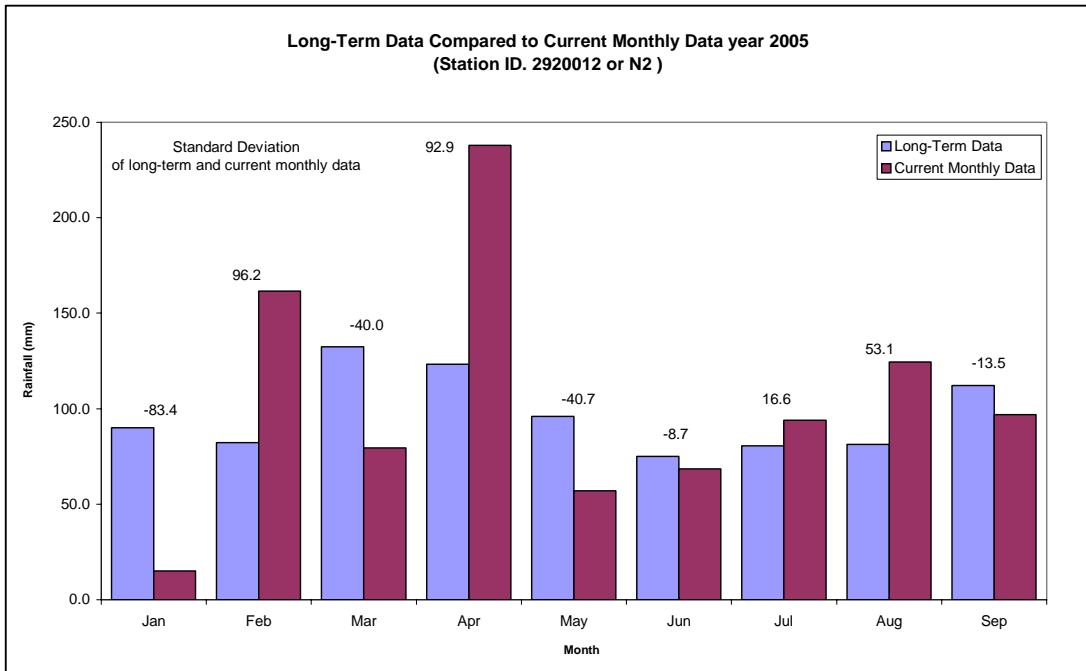


Figure 1.6 : Long-Term Data Compared to Current Monthly Data (year 2005) in Negeri Sembilan.

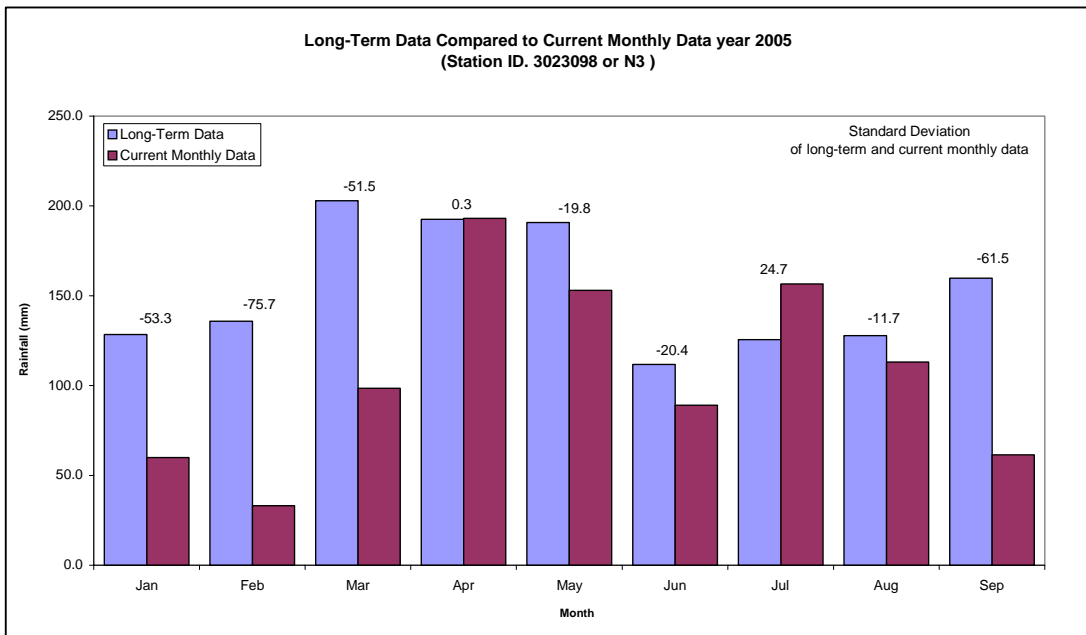


Figure 1.7: Long-Term Data Compared to Current Monthly Data (year 2005) for Negeri Sembilan

2.0 Drought Monitoring by River Flow

2.1 Based on Table 2.1 and 2.2, as on October 21, 2005, the overall water level for the stations being monitored are significantly improved except Sg. Bernam at SKC Bridge has decreased from 16 cumecs (22 September) to 13 cumecs..

2.2 Table 2.2 shows the on-line reading of 10 water level stations extracted from the Drought Information Website as on October 22, 2005.

Table 2.1 : Drought Monitoring by River Flow

Station Id	Name	State	River Flow (m ³ /s)						
			April 30	May 30	June 6	July 18	Aug. 15	Sept. 22	Oct. 21
5721480	Sg.Kelantan @ Guillardmard Bridge	Kelantan	83	254	245	128	102	136	263
5606480	Sg.Muda @ Syed Omar Bridge	Kedah	19	21	21	11	3	5	98
2816490	Sg.Langat @ Dengkil	Selangor	10	7	7	25	27	8	40
3813480	Sg.Bernam @ SKC Bridge	Selangor	19	16	16	13	11	16	13
4809490	Sg.Perak @ Kuala Kangsar	Perak	191	184	184	183	150	184	259
5007490	Sg.Kurau @ Pondok Tanjong	Perak	3.4	4.1	4.1	3.8	1.2	1.8	22.5
5206490	Sg.Kerian @ Selama	Perak	5.3	6.3	6.3	6.9	5.5	7.7	20.9
3424490	Sg.Pahang @ Temerloh	Pahang	258	277	277	330	187	249	203
2527490	Sg.Muar @ Buluh Kasap	Johor	No data					9	26
1737490	Sg.Johor @ Rantau Panjang	Johor	5.3	3	3	18	2	10	36

Table 2.2 : Drought Monitoring by River Flow
(on-line Infokemarau)

Station Id	Name	State	Last Update	Water Level (m)	River Flow (m ³ /s)	Drought Flow For Various Return Periods(m ³ /s)			
						2-year	5-year	10-year	20-year
5721480	Sg.Kelantan @ Guillerdmard Bridge	Kelantan	21/10/2005-09:01	9.13	263	154	114	88	69
5606480	Sg.Muda @ Syed Omar Bridge	Kedah	21/10/2005-09:02	8.33	98	13	8	5	3
2816490	Sg.Langat @ Dengkil	Selangor	21/10/2005-08:21	3.53	40	5	3	2	1
3813480	Sg.Bernam @ SKC Bridge	Selangor	21/10/2005-08:55	16.75	13	15	12	10	9
4809490	Sg.Perak @ Kuala Kangsar	Perak	21/10/2005-09:00	32.75	259	66	36	22	14
5007490	Sg.Kurau @ Pondok Tanjong	Perak	21/10/2005-09:01	12.85	22.5	3.4	2.4	1.9	1.5
5206490	Sg.Kerian @ Selama	Perak	21/10/2005-09:01	9.61	20.9	10.9	7.7	6.2	4.9
3424490	Sg.Pahang @ Temerloh	Pahang	21/10/2005-09:05	23.51	203	180	125	100	80
2527490	Sg.Muar @ Buluh Kasap	Johor	21/10/2005-09:00	6.05	26	7.2	4.2	2.9	2.0
1737490	Sg.Johor @ Rantau Panjang	Johor	21/10/2005-09:02	4.48	36	8.5	5.5	4.2	3.2


3.0 Drought Monitoring by Dam Storage

3.1 From the six dams being monitored by this Division as shown in Table 3.1 and 3.2, only one dam i.e. Macap, where the water level is still below the alert level with reading of 14.71 m (i.e 0.41m below the alert level). Based on rainfall data (October total rainfall compared to its long term average) for this particular area shows that it exceeds the long term average by 29% in September but having a deficit for the following month i.e -25.9% (October 21, 2005).

Table 3.1 : Water Level of the Dams being monitored
(confine to those dams regulated by DID)
Comparison of data from Aug. to Oct. 2005

Station Id	Name	State	Alert Level (m)	Water Level (m)			Remaining Dam Storage (MCM)			Remaining Dam Storage (%)		
				Aug. 15	Sept 22	Oct. 21	Aug. 15	Sept 22	Oct. 21	Aug. 15	Sept 22	Oct. 21
3216490	Batu Dam	KL	93.00	101.42	100.92	101.21	29.24	28.2	28.8	90.83	87.62	89.47
3217480	Klang Gates Dam	KL	90.00	90.11	90.65	91.18	17.16	18.22	19.3	60.12	63.85	67.63
6602481	Timah Tasoh Dam	Perlis	27.68	28.02	28.22	29.16	20.12	22.29	33.74	61.06	67.65	99.6
1832480	Macap Dam	Johor	15.12	14.26	14.55	14.71	3.30	4.38	5.03	31.51	41.9	48.09
1931480	Sembrong Dam	Johor	7.19	6.30	6.22	7.29	4.49	4.16	9.4	25.51	23.66	53.42
2030481	Bekok Dam	Johor	12.50	13.26	13.26	13.26	30.97	30.97	30.97	97.34	97.34	97.34

Table 3.2 : Drought Monitoring by Dam Level
(on-line Infokemarau)

 JPS MALAYSIA Drought Monitoring By Dam Levels (Under Construction)							
Station Id	Name	State	Last Update	Water Level (m)	Alert Level (m)	Remaining Dam Storage (MCM)	Remaining Dam Storage (%)
3216490	Batu Dam	KL	21/10/2005-09:16	101.21	93.00	28.80	89.47
3217480	Klang Gates Dam	KL	21/10/2005-09:17	91.18	90.00	19.30	67.63
6602481	Timah Tasoh Dam	Perlis	21/10/2005-09:00	29.16	27.68	33.74	99.60
...	Bukit Merah Dam	Perak	21/10/2005-09:02	8.26	7.66	n/a	n/a
1832480	Macap Dam	Johor	21/10/2005-09:02	14.71	15.12	5.03	48.09
1931480	Sembrong Dam	Johor	21/10/2005-09:01	7.29	7.19	9.40	53.42
2030481	Bekok Dam	Johor	21/10/2005-09:00	13.26	12.50	30.97	97.34

3.4 Figure 3.1 shows that, the Macap Dam level has fall below the alert level since March 25, 2005. The monthly rainfall during this period starting March until October is 97.5 mm (March), 110.5 mm (April), 168.0 mm (May), 46.0 mm (June), 171.5 mm (July), 98.5 mm (August), 218.5 mm (September) and 143.0 mm (October) respectively.

By observing the hydrograph of the Macap dam as in Figure 3.1 below, the worst case of drought is expected to occur if there is no or little rain in the coming months thus affecting further drawdown of the water level. But historically, this would not be the case as the intermonsoon period is just started which could have bring more rain. The lowest water level reading for Machap Dam is recorded on March 8 & 9, 1997 i.e 13.59m caused by the small amount of rainfall received i.e. 39mm for the two previous months.

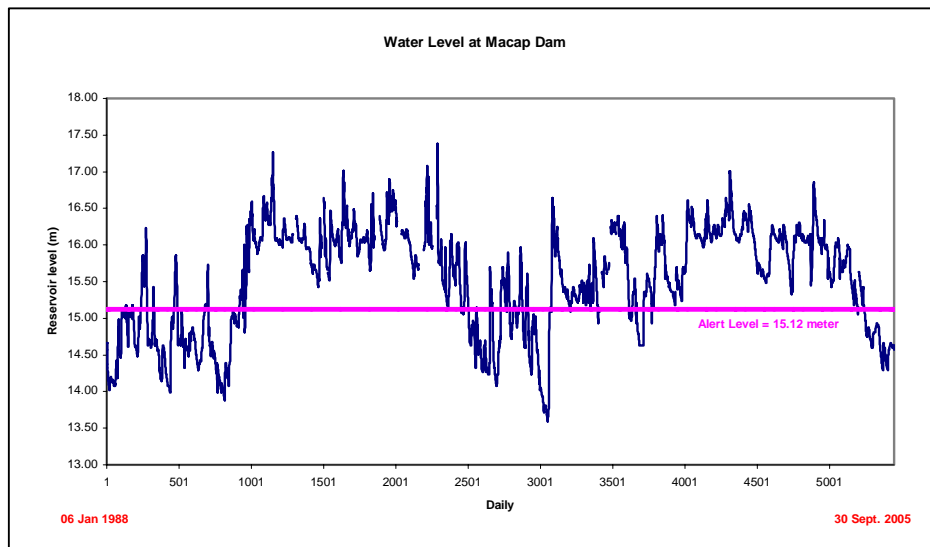


Figure 3.1 : Water Level at Macap Dam, Johor

3.2 Figure 3.2 shows the hydrograph for the water level of Sembrong Dam, Johor. From this figure, we can clearly observe that there are many cases of the drawdown of water level, but the recent one is quite critical as the water level has fell below the alert level. This drawdown of water level is due to less rainfall recorded during the previous months starting April.

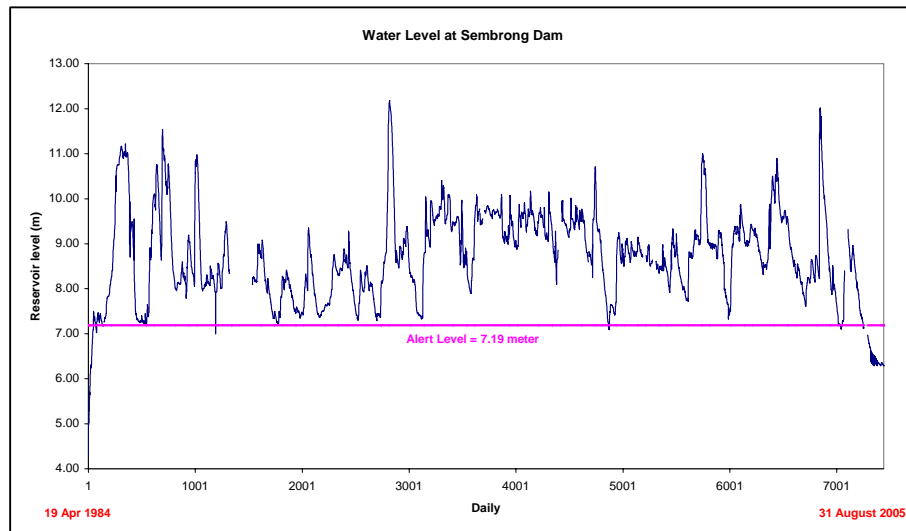


Figure 3.2 : Water Level at Sembrong Dam, Johor