

Sungai Johor

Map of River

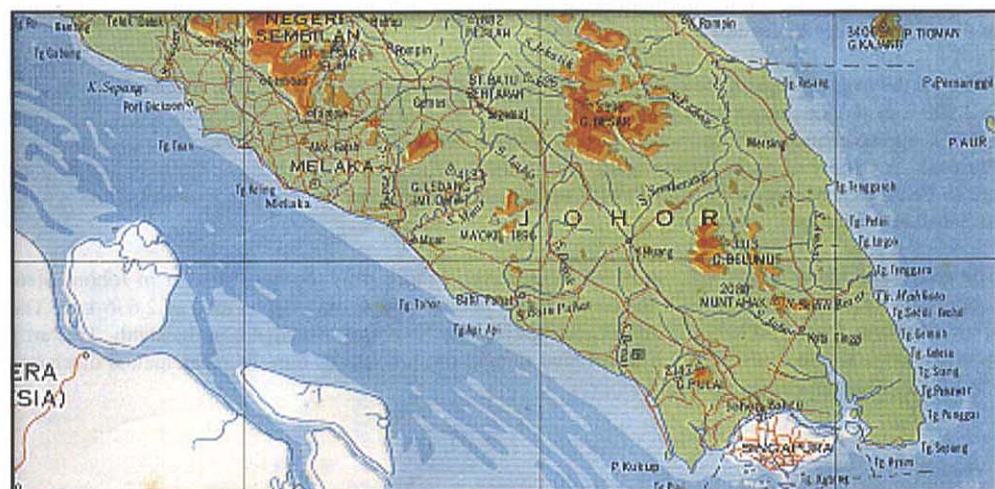
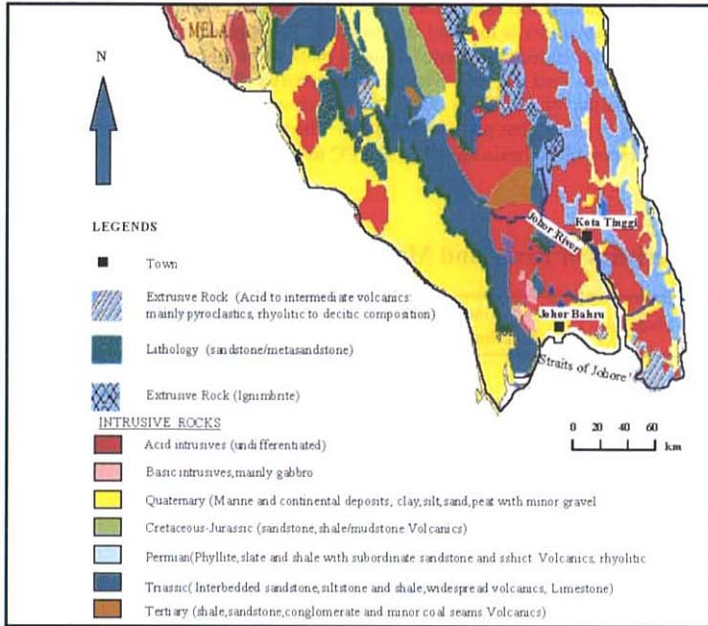


Table of Basic Data

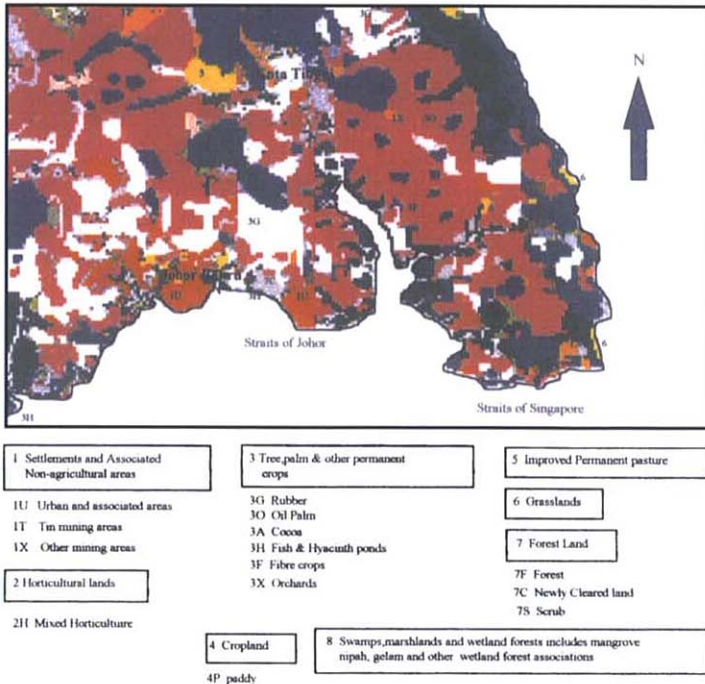
Name: Johor River		Serial No.: Malaysia-2
Location: Central part of south Johor	N 1° 27' ~ 1° 49'	E 103° 42' ~ 104° 01'
Area: 2,636 km ²	Length of main stream : 122.7 km	
Origin: Mt Gemuruh (109m)	Highest point: Mt. Belumut (1,010 m)	
Outlet: Straits of Johor	Lowest point: River mouth (0 m)	
Main geological features: Intrusive rocks, Quaternary, Triassic, Permian, Cretaceous-Jurassic, Tertiary		
Main tributaries: Sayong River, Lingui River, Semangar River, Tiram River, Layang River, Lebam River		
Main lakes: Nil		
Main reservoirs: Lingui Dam (Impounded in 1993)		
Mean annual precipitation: 2,470mm (basin average)		
Mean annual runoff: 37.5 m ³ /s at Rantau Panjang (1963-1992)		
Population: 220,000	Main cities: Kota Tinggi	
Land use: Urban (5.5%), Forest (16.4%), Oil Palm, Other crops (18.5%), waterbody (0.5%), Swamps (11.6%)		

2. Geographical Information

2.1 Geological Map



2.2 Land Use Map



1. General Description

The Johor river, 122.7 km long, drains an area of 2,636 km². It originates from Mt.Gemuruh and flows through the southeastern part of Johor and finally into the Straits of Johor. The catchment is irregular in shape. The maximum length and breadth are 80 km and 45 km respectively. About 60% of the catchment is undulating highland rising to a height of 366 m while the remainder is lowland and swampy. The highland in the north is mainly jungle. In the south a major portion had been cleared and planted with oil palm and rubber. The highland areas have granite soil cover consisting of fine to coarse sand and clay. The alluvium consists of fine sand and clay. The catchment receives an average annual precipitation of 2,470mm while the mean annual discharge measured at Rantau Panjang (1,130km²) has been 37.5 m³/s during the period 1963-1992. The major tributaries are Sayong, Linggiu, Tiram and Lebam Rivers. The temperature in the basin ranges from 21°C to 32°C.

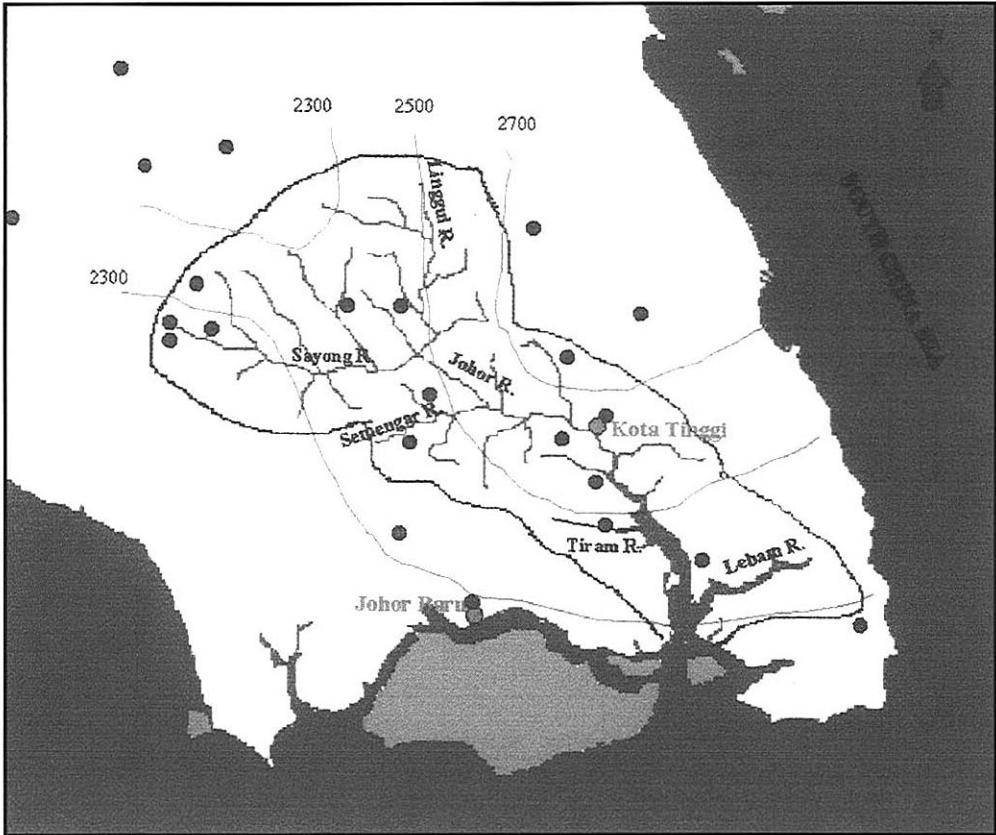
2.3 Characteristics of River and Main Tributaries

No.	Name of river	Length [km] Catchment area [km ²]	Highest peak [m] Lowest point [m]	Land use [%] (1990)
1	Johor (Main river)	76.2	150	A (18.5%)
		1,130	<50	U (7.6%) F (16.4%) L(11.6%)
2	Sayong (Tributary)	46.3	200	O (2.1%)
		737.3	50	
3	Linggiu (Tributary)	46.5	799	
		383.6	50	
4	Tiram (Tributary)	33.5	315	
		122.7	50	

A: Other agricultural field (vegetable, grass) F: Forest L: Lake, River, Marsh O: Orchard P: Paddy field U: Urban

3. Climatological Information

3.1 Annual Isohyetal Map and Observation Stations



3.2 List of Meteorological Observation Stations

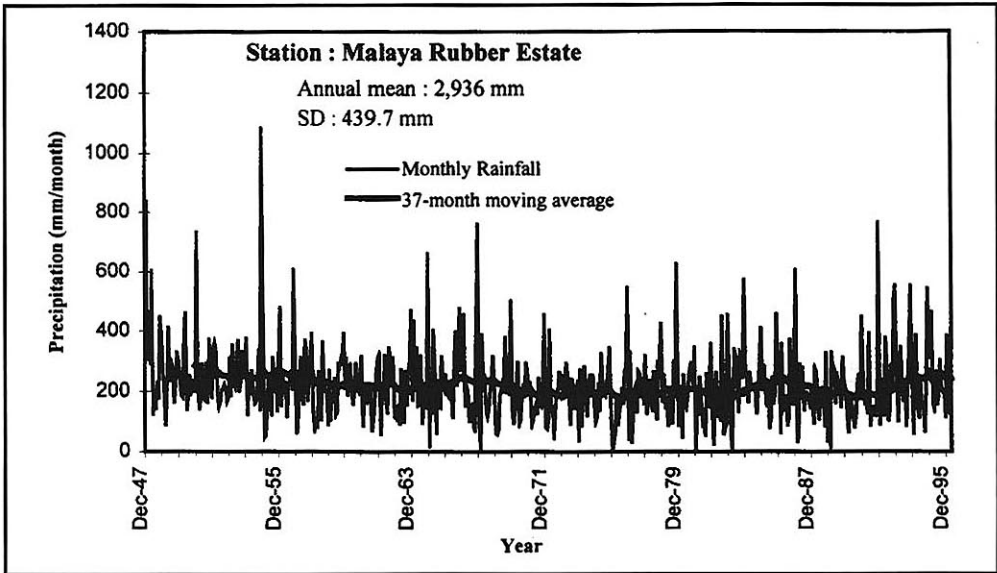
No.	Station	Elevation [m]	Location	Observation period	Mean annual precipitation ¹⁾ [mm]	Observation items ²⁾
1539134	Sg.Tiram estate		N 01 ° 35' 15" E 103 ° 55' 05"	1949~1996	2,525.8	M8
1540135	Telok Sengat estate	15	N 01 ° 34' 05" E 104 ° 02' 20"	1948~1996	2,448.1	M8
1639132	Nam Heng estate		N 01 ° 39' 15" E 103 ° 55' 35"	1947~1996	2,644.1	M8
1738131	Malaya rubber estate		N 01 ° 42' 10" E 103 ° 53' 10"	1947~1996	2,636.0	M8
1739002	Mawai estate	5	N 01 ° 44' 15" E 103 ° 55' 25"	1974~1996	2,570.4	M8
1739003	Permatang estate		N 01 ° 46' 35" E 103 ° 55' 35"	1975~1996	2,798.8	M8
1833092	Simpang Rengam estate		N 01 ° 51' 25" E 103 ° 20' 10"	1947~1996	2,316.0	M8
1833123	Benut estate		N 01 ° 50' 20" E 103 ° 21' 10"	1949~1996	2,254.3	M8
1834001	Ulu Remis		N 01 ° 50' 45" E 103 ° 28' 30"	1989~1995	2,235.3	M8 HW
1834122	Rengam Estate	48	N 01 ° 53' 20" E 103 ° 24' 55"	1947~1996	2,324.8	M8
1835001	Pekan Layang-layang estate		N 01 ° 51' 20" E 103 ° 35' 15"	1977~1996	2,487.1	M8
1836001	Ulu Sebol estate		N 01 ° 52' 30" E 103 ° 38' 15"	1975~1996	2,399.5	M8

Note: M8 - Manual raingauge (daily)
M8 HW - Manual raingauge (Long term)

3.3 Monthly Climate Data

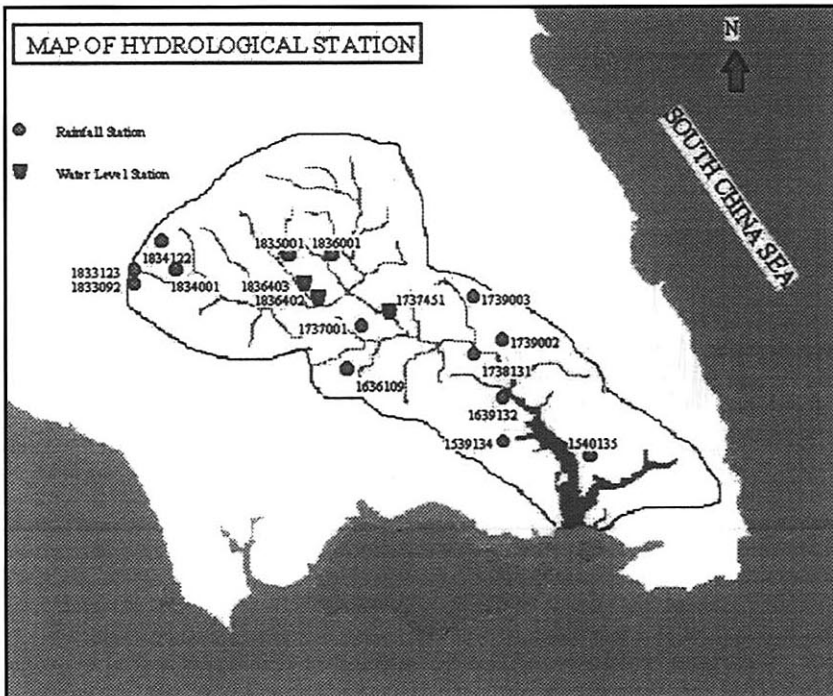
Observation item	Observation station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Period for the mean
Temperature [°C]	JB Airport	26.3	26.8	27.2	27.4	27.4	27.4	26.9	27.1	26.8	27.2	26.8	26.4	27.0	1970~1995
Precipitation [mm]		144.2	144.3	198.0	223.7	21.8	156.4	164.8	158.5	215.5	222.0	245.1	232.4	2,626	1970~1995
Evaporation [mm]		3.6	4.2	3.9	3.8	3.4	3.5	3.4	3.5	3.3	3.4	3.2	3.1	3.5	1983~1995
Duration of sunshine [hr]		5.7	6.7	5.9	5.9	5.6	5.7	5.5	5.3	4.4	4.6	4.2	4.4	5.3	1974~1995

3.4 Long-term Variation of Monthly Precipitation



4 Hydrological Information

4.1 Map of Hydrological Stations



4.2 List of Hydrological Observation Stations

No.*	Station	Location	Catchment area (A) [km ²]	Observation period	Observation items ¹⁾ (frequency)
1737451	Johor River	N 01°46'50" E 103°44'45"	1,130	1963-1995	WL,Q (Au)
1836402	Sayong River	N 01°48'15" E 103°40'10"	624	1977-1995	WL,Q (Au)
1836403	Penggeli River	N 01°49'15" E 103°37'15"	143	1983-1993	WL,Q (Au)

No.*	\bar{Q} ²⁾ [m ³ /s]	Q max ³⁾ [m ³ /s]	\bar{Q} max ⁴⁾ [m ³ /s]	\bar{Q} min ⁵⁾ [m ³ /s]	\bar{Q} / A [m ³ /s/100km ²]	Q max / A [m ³ /s/100km ²]	Period of statistics
1737451	37.5	587.9	265.4	7.22	3.3	52.0	1966-1995
1836402	18.15	288.7	43.15	6.71	2.9	46.3	1977-1995

*: Water level recording station number used in DID Malaysia

1) WL: Water level Q:Discharge (rating curve used)
Au: Automatic water level recording station

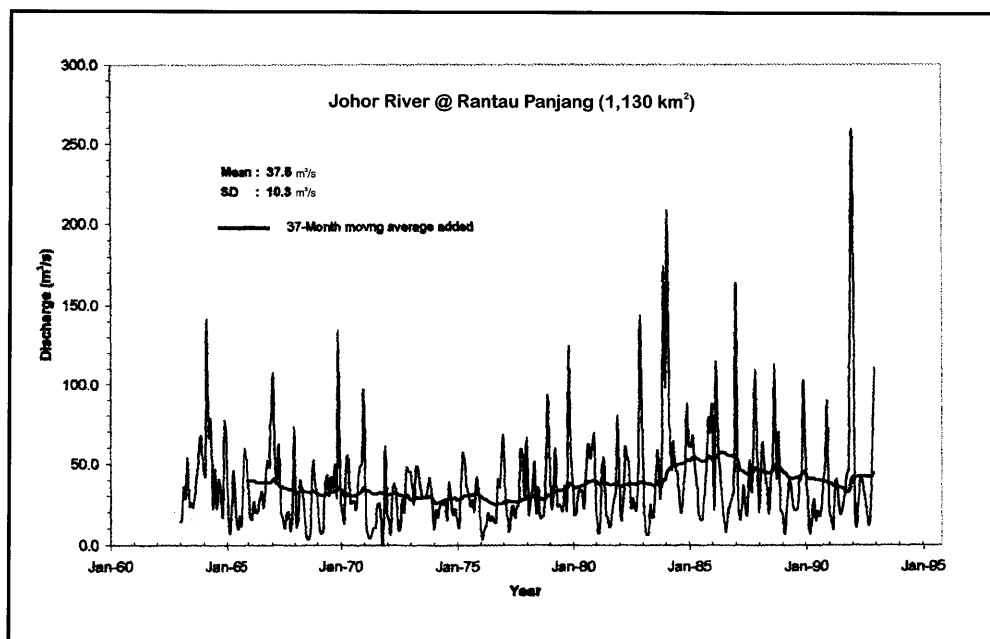
2) Mean annual discharge

3) Maximum discharge

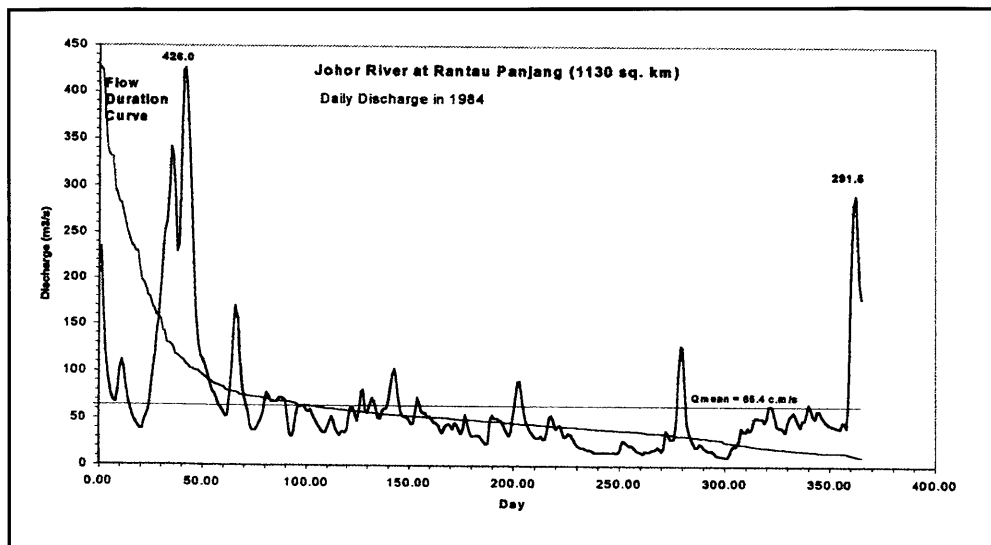
4) Mean maximum discharge

5) Mean minimum discharge

4.3 Long Term Variation of Monthly Discharge



4.4 Annual Pattern of Discharge



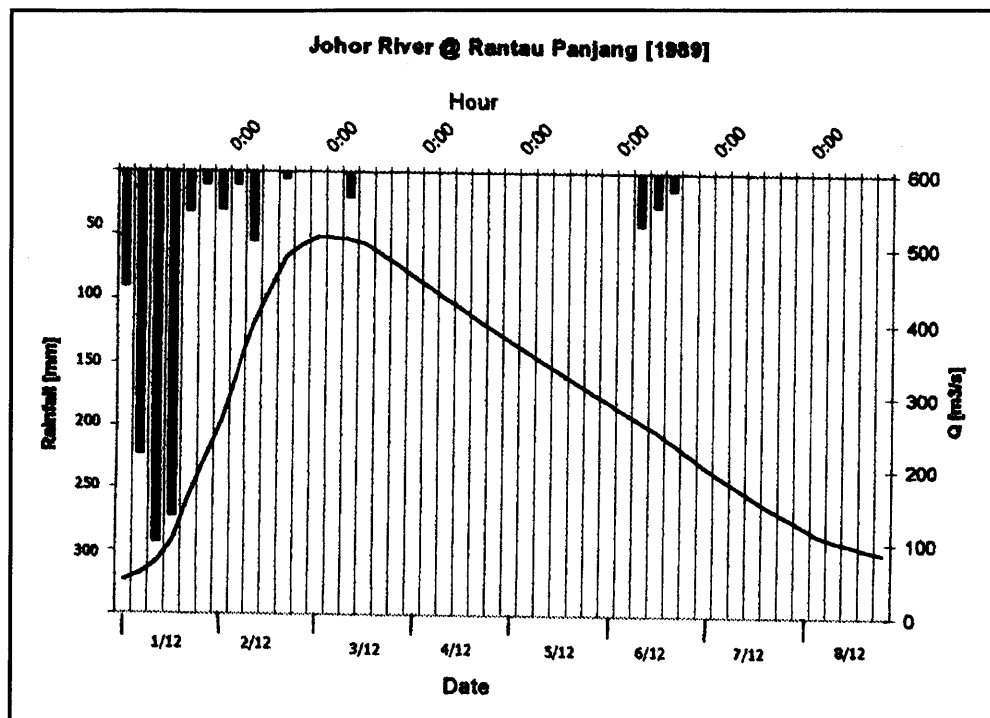
4.6 Annual Maximum and Minimum Discharges

at Rantau Panjang (1737451) [1,130 km²]

Year	Maximum ¹⁾		Minimum ²⁾		Year	Maximum ¹⁾		Minimum ²⁾	
	Date	[m ³ /s]	Date	[m ³ /s]		Date	[m ³ /s]	Date	[m ³ /s]
1965	10.30	98.7	07.10	5.5	1981	01.18	278.4	01.02	2.8
1966	11.12	86.7	07.01	8.0	1982	01.24	539.4	02.22	7.8
1967		-- *	08.10	6.6	1983	01.28	549.6	04.21	4.1
1968		-- *	10.02	11.1	1984	02.10	437.3	01.27	9.9
1969	12.11	587.9	03.08	5.1	1985	01.05	194.9	07.03	7.7
1970	07.25	93.8	03.10	5.8	1986	03.11	363.4	08.24	4.5
1971	01.04	281.5	05.08	3.8	1987	01.18	204.5	03.14	10.9
1972	11.29	89.1	03.11	5.1	1988	01.22	268.4	06.16	11.4
1973	02.20	134.9	02.11	11.1	1989	01.03	512.1	03.01	3.7
1974	09.20	80.7	01.26	5.9	1990	01.17	148.4	04.01	4.7
1975	04.21	109.4	02.05	6.5	1991	01.23	463.6	03.14	5.2
1976	12.31	197.5	02.26	2.1	1992	01.14	446.1	01.31	7.1
1977	01.02	204.5	04.27	4.9	1993	01.02	112.7	08.09	12.1
1978	12.04	263.3	10.08	9.6	1994	01.26	168.4	01.14	3.3
1979	11.26	336.9	07.11	10.9	1995	02.07	483.0	01.19	21.8
1980	11.26	120.3	12.21	4.97					

1), 2) Instantaneous observation by recording chart ; -- * Not available.

4.7 Hyetograph and Hydrograph of Major Floods



5 Water Resources

5.1 General Description

The Johor River basin occupies about 14 % of the Johore State of Peninsula Malaysia. Johor River and its tributaries are important sources of water supply not only for Johor State but also for Singapore. Syarikat Air Johor, SAJ (or Johor Water Company) and Public Utility Board of Singapore each draws about 0.25×10^6 m³/day of water from Johore River near Kota Tinggi. Both water supply schemes have been operational since the mid-1960's. There are a few other small scale water supply schemes operating within this catchment drawing water from Sayong, Semangor and Lebam rivers, tributaries of Johor River. Their combined extraction capacity is only less than 0.01×10^6 m³/day. In addition, the Linggui Dam completed and impounded in 1993 is supplementing the water supply to both Johore and Singapore.

Since 1963, there were five occurrences of major floods causing disruption and damages to public utilities and properties as well as loss of lives. All these floods were caused by heavy rainfall brought about during the North-East Monsoon in the months of December and January. There is no major drought experienced in this catchment.

5.3 Major water Resources facilities - Linggui Dam

The dam was constructed on Linggui River at about 12 km upstream of the confluence of Linggui/Johor Rivers. The reservoir catchment area covers 208 km² of predominantly jungle covered land. The dam is a major component of the Linggui Reservoir (Water Supply) Project jointly developed by the Johor and Singapore governments. It was built to ensure a reliable abstraction through a 1 in 20 year drought of 1.59×10^6 m³/day. It has a gross storage of 772×10^6 m³ with 762×10^6 m³ as live storage. Since it drains only 10% of the total area of the Johor River catchment, it does not have significant impact on the mitigation of flooding downstream.

5.4 Major Floods and Droughts

Major Floods at Johor River Catchment

Note that all these floods occurred during the North-East Monsoon which begins in November and ends in January.

Date	Water level [m]	Rainfall [mm]	Meteorological al cause	Dead and missing	Major damages [Districts affected]
1967.12-1968.1	4.39 @ Kota Tinggi on 1968.01.02	500 recorded at most stations.	Widespread heavy rainfall	3	Mines and roads were flooded and damages. 2-3 thousand people were evacuated
1981.12.16	9.69 @ Rantau Panjang	81.5 @ Ulu Sebol Estate	Heavy rainfall		540 people were evacuated for 1-day depth of flood 0.41m. Road communication from Kota.Tinggi to Desaru resort was disrupted for 7 days. 2 road bridges collapsed
1982.12.17-1982.12.23	10.03 @ Rantau Panjang	552 @ Permatang Estate	Heavy rainfall River level overtop the bank		295 people were evacuated from 6 villages. 1,299 Ha agricultural land submerged in water
1987.01.13-1987.01.14	2.59 @ K.Tinggi 9.97 @ R.Panjang	532.5 @ Ulu Sebol Estate	Widespread heavy rainfall.		806 people from 13 villages were evacuated 2-6 days (Rengam and Layang-layang)
1989.12.03	10.13 @ Rantau Panjang	399	Widespread heavy rainfall. Overflow from river	2	996 people from 10 village were evacuated for 2-5 days.100 ha agricultural land submerged in water. 1 bridge washed away

Note : Designated ¹danger level of river stage at :
 Rantau Panjang = 9.56 m.
 Kota Tinggi = 2.74 m.

1) :- when the flooded areas are considered unsafe and evacuation of residents will be effected

7. References, Data Books and Bibliography

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