

Table 46

WATER DEMAND AND SUPPLY BALANCE
OF INTEGRATED OPERATION SYSTEM (2/18)

Unit: 10⁶ m³

Sources Facilities: Pedu-Muda, Ahning
Case 3 (Kedah Priority)

Target Year 1990

	MUDA DEMAND		DEMAND SOUTH		KEDAH WITHD.		NORTH DEFIC.		JERANG WITHD.		RELEASE NAOK		MUDA SOUTH TOTAL		RESERVOIR			REMAIN. CUT TOTAL	
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)	(P)	(Q)	(R)	
1961	63.1	791.3	553.8	268.1	543.5	0.	0.	0.	63.1	333.4	974.5	907.9	63.5	0.	0.	2.7	0.40	1205.	
1962	63.1	597.3	265.4	260.6	360.6	0.	0.	0.	63.1	241.5	669.0	607.8	58.9	0.	0.	2.1	0.60	924.	
1963	64.0	559.0	269.8	150.0	429.5	0.	0.	0.	64.0	249.9	754.9	669.8	34.2	0.	0.	45.9	0.75	848.	
1964	63.8	576.5	229.4	186.7	402.9	0.	0.	0.	63.8	216.3	688.0	654.1	33.9	0.	0.	0.	0.65	870.	
1965	63.5	599.3	282.9	292.7	362.7	0.	0.	0.	63.5	226.5	654.7	633.2	21.5	0.	0.	0.	0.50	946.	
1966	63.1	672.8	363.1	302.6	415.5	0.	0.	0.	63.1	317.8	814.8	763.8	51.1	0.	0.	0.	0.50	1099.	
1967	63.1	855.4	438.0	400.1	540.2	0.	0.	0.	63.1	353.1	992.5	952.1	40.4	0.	0.	0.0	0.	1356.	
1968	67.0	779.9	396.5	433.5	430.1	0.	0.	0.	67.0	312.8	825.4	772.3	53.1	0.	0.	5.0	0.30	1258.	
1969	63.1	669.8	306.4	328.7	394.4	0.	0.	0.	63.1	253.1	719.4	645.3	74.1	0.	0.	0.	0.50	1059.	
1970	65.5	615.5	361.5	340.2	318.8	0.	0.	0.	65.5	317.9	929.8	878.3	51.5	0.	0.	0.	0.20	1240.	
1971	63.1	935.9	522.6	541.3	503.4	0.	0.	0.	63.1	406.3	1016.3	969.8	46.5	0.	0.	0.	0.	1520.	
1972	63.7	844.4	372.4	418.8	507.0	0.	0.	0.	63.7	291.0	886.6	839.5	47.1	0.	0.	0.	0.30	1281.	
1973	63.1	779.4	339.5	489.1	354.4	0.	0.	0.	63.1	275.4	699.8	656.3	43.5	0.	0.	0.	0.50	1182.	
1974	63.5	989.1	544.1	429.0	606.2	0.	0.	0.	63.5	498.0	1226.9	1171.0	51.8	0.	0.	3.6	0.	1593.	
1975	63.1	586.5	272.6	305.0	322.5	0.	0.	0.	63.1	231.6	615.7	534.3	81.3	0.	0.	0.0	0.60	922.	
1976	63.7	744.3	352.9	439.2	387.7	0.	0.	0.	63.7	270.4	731.2	690.2	40.9	0.	0.	0.0	0.40	1161.	
1977	64.1	1032.8	509.5	269.1	811.5	0.	0.	0.	61.9	461.7	1414.7	1103.0	60.6	0.	0.	230.2	0.	1378.	
1978	64.1	627.0	245.7	289.4	379.6	0.	0.	0.	62.6	205.5	648.1	565.0	83.2	0.	0.	1.5	0.50	955.	
1979	64.6	668.5	330.6	356.2	384.6	0.	0.	0.	59.6	258.3	714.3	636.4	77.9	0.	0.	5.0	0.50	1059.	
1980	64.4	622.7	236.0	209.3	447.1	0.	0.	0.	63.7	202.3	721.5	632.6	84.3	0.	0.	4.8	0.50	918.	
1981	64.0	891.4	396.7	345.6	563.7	0.	0.	0.	62.9	378.9	1047.3	975.7	73.6	0.	0.	1.1	0.50	1351.	
1982	64.2	454.2	199.1	319.5	168.8	0.	0.	0.	58.6	145.0	370.9	324.9	46.0	0.	0.	5.6	0.75	712.	
1983	65.3	950.5	457.9	433.4	606.2	0.	0.	0.	60.8	368.8	1033.4	1050.9	32.5	0.	0.	4.5	0.15	1469.	
AVERAGE	63.9	741.0	349.8	339.5	455.1	0.	0.	0.	62.7	296.2	834.8	766.6	54.4	0.	0.	13.6	0.58	1141.	

Target Year 2000

	MUDA DEMAND		DEMAND SOUTH		KEDAH WITHD.		NORTH DEFIC.		JERANG WITHD.		RELEASE NAOK		MUDA SOUTH TOTAL		RESERVOIR			REMAIN. CUT TOTAL	
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)	(P)	(Q)	(R)	
1961	63.1	925.8	345.8	364.0	579.9	0.	0.	0.	63.1	327.7	1008.5	940.3	68.2	0.	0.	0.	0.40	1355.	
1962	63.3	680.3	207.1	334.4	329.5	0.	0.	0.	63.3	185.5	570.0	514.2	55.8	0.	0.	0.	0.75	951.	
1963	65.3	700.9	265.7	208.6	509.5	0.	0.	0.	65.3	246.7	840.0	780.5	52.4	0.	0.	24.4	0.75	1005.	
1964	64.6	719.9	234.6	268.7	468.2	0.	0.	0.	64.6	221.4	764.1	728.5	35.6	0.	0.	0.0	0.65	1019.	
1965	64.2	678.6	242.7	380.2	357.3	0.	0.	0.	64.2	183.8	601.2	580.9	20.3	0.	0.	0.0	0.75	986.	
1966	63.1	837.6	329.1	426.0	463.8	0.	0.	0.	63.1	276.9	823.0	772.0	51.0	0.	0.	0.	0.50	1230.	
1967	63.1	910.5	358.4	514.4	480.6	0.	0.	0.	63.1	274.0	856.4	796.6	59.8	0.	0.	0.	0.20	1332.	
1968	68.3	999.8	407.8	532.1	544.5	0.	0.	0.	61.7	331.1	972.8	918.7	54.1	0.	0.	6.0	0.20	1469.	
1969	63.3	823.2	302.7	437.5	436.6	0.	0.	0.	63.3	251.9	765.0	685.1	79.9	0.	0.	0.	0.50	1189.	
1970	63.3	940.2	356.1	450.3	536.3	0.	0.	0.	63.3	309.6	959.9	890.4	49.5	0.	0.	0.0	0.20	1360.	
1971	63.7	983.1	447.4	652.7	461.2	0.	0.	0.	63.7	336.6	886.4	841.9	44.4	0.	0.	0.	0.20	1494.	
1972	64.4	1050.8	400.2	528.1	680.5	0.	0.	0.	64.4	322.5	1025.4	975.6	49.7	0.	0.	0.	0.20	1515.	
1973	63.7	927.4	307.5	602.9	377.7	0.	0.	0.	63.7	254.2	702.1	660.1	42.0	0.	0.	0.0	0.50	1299.	
1974	63.8	1024.6	475.4	548.1	524.5	0.	0.	0.	63.8	427.4	1057.7	1004.4	53.3	0.	0.	0.0	0.20	1564.	
1975	65.1	776.7	296.9	413.2	409.1	0.	0.	0.	63.1	251.5	735.8	647.9	85.8	0.	0.	0.0	0.50	1157.	
1976	64.1	895.4	354.8	544.8	425.9	0.	0.	0.	64.1	279.4	783.7	739.1	44.6	0.	0.	0.0	0.40	1314.	
1977	68.0	1209.6	508.9	351.6	895.7	0.	0.	0.	62.8	473.2	1518.8	1130.0	62.0	0.	0.	299.5	0.	1487.	
1978	64.8	725.2	216.5	398.3	367.3	0.	0.	0.	62.9	175.9	603.6	518.0	85.5	0.	0.	1.9	0.60	1004.	
1979	67.3	825.0	315.5	461.3	434.3	0.	0.	0.	60.6	244.9	734.7	665.7	85.5	0.	0.	9.8	0.50	1198.	
1980	65.2	710.3	214.7	317.8	431.6	0.	0.	0.	64.3	175.6	644.7	590.4	80.1	0.	0.	4.7	0.60	986.	
1981	64.7	1063.9	409.7	431.7	640.4	0.	0.	0.	63.3	401.4	1157.6	1080.1	77.5	0.	0.	1.4	0.30	1537.	
1982	66.1	609.7	215.9	443.8	226.0	0.	0.	0.	58.5	155.8	424.3	384.2	40.0	0.	0.	7.5	0.75	884.	
1983	65.7	982.3	375.4	533.2	537.5	0.	0.	0.	60.3	287.1	916.2	888.1	28.1	0.	0.	5.4	0.35	1418.	
AVERAGE	64.6	868.7	329.8	441.0	479.7	0.	0.	0.	63.1	277.9	841.8	771.1	55.0	0.	0.	15.7	0.62	1247.	

Table 47

WATER DEMAND AND SUPPLY BALANCE
OF INTEGRATED OPERATION SYSTEM (3/18)

Unit: 10⁶ m³

Sources Facilities: Pedu-Muda, Ahning, Jeniang
Case 1 (Muda Priority)

Target Year 1990

	MUDA DEMAND (A)	MUDA NORTH (D)	DEMAND SOUTH (C)	KEDAH WITHD. (D)	NORTH DEFIC. (E)	JENIANG WITHD. (F)	RELEASE MAK (G)	REMAN (H)	MUDA RELEA. (I)	SOUTH DEFIC. (J)	TOTAL DEFIC. (K)	R E S E R V O I R			REMAN. DEFICIT (O)	CUT RATE (P)	TOTAL OUTPUT (R)	
	(A)	(D)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	PEDU (L)	AHNING (M)	BERIS (N)	T.MUDA (O)	(P)	(Q)	(R)
1981	63.1	822.4	367.2	269.3	491.5	162.2	87.5	0.	63.1	179.2	745.2	697.7	47.5	0.	0.	0.0	0.35	1233.
1982	63.1	723.3	330.8	242.6	375.6	169.8	107.3	0.	63.1	138.7	571.4	497.2	74.2	0.	0.	0.0	0.40	1117.
1983	67.4	925.8	441.0	150.0	721.2	192.8	44.4	0.	65.5	258.4	1088.4	971.6	56.0	0.	0.	0.0	0.25	1378.
1984	69.8	745.2	314.1	189.3	447.9	169.1	74.2	0.	65.0	176.7	694.0	610.4	83.6	0.	0.	4.8	0.40	1124.
1985	68.0	754.1	357.9	292.9	459.6	143.3	28.9	0.	64.9	187.3	718.7	665.0	55.7	0.	0.	3.1	0.40	1177.
1986	63.1	696.7	377.6	305.0	359.5	164.6	80.3	0.	63.1	167.0	584.9	545.7	39.2	0.	0.	0.	0.25	1137.
1987	63.1	855.4	438.0	400.1	462.7	125.2	103.5	0.	63.1	199.9	736.2	703.6	32.6	0.	0.	0.0	0.	1356.
1988	113.3	961.4	489.1	440.1	548.2	96.3	47.8	0.	62.0	318.2	962.6	916.8	45.9	0.	0.	51.5	0.	1513.
1989	63.1	819.7	386.0	330.0	463.8	156.2	55.0	0.	63.1	208.7	738.4	696.6	41.7	0.	0.	0.0	0.25	1269.
1990	63.5	944.0	420.3	340.2	515.0	208.9	83.2	0.	63.5	217.2	813.5	772.4	41.1	0.	0.	0.0	0.	1428.
1971	63.1	933.9	522.6	541.8	460.5	96.6	77.3	0.	63.1	280.2	823.0	786.1	36.9	0.	0.	0.0	0.	1520.
1972	67.2	1038.5	457.7	443.3	636.4	71.1	36.5	0.	65.2	308.8	1030.3	1005.4	44.9	0.	0.	2.0	0.	1561.
1973	63.1	894.8	398.9	504.4	377.1	133.6	78.1	0.	63.1	200.5	641.8	610.7	31.1	0.	0.	0.0	0.10	1357.
1974	66.6	989.1	544.1	429.0	560.2	102.3	63.4	0.	65.1	377.8	1042.2	997.2	45.0	0.	0.	1.5	0.	1598.
1975	63.1	775.4	370.7	305.0	442.7	157.7	69.0	0.	63.1	171.8	682.7	641.3	41.5	0.	0.	0.0	0.25	1209.
1976	66.7	927.2	437.7	447.0	492.0	142.9	92.5	0.	64.4	190.6	758.4	722.1	36.3	0.	0.	2.3	0.10	1429.
1977	110.0	1052.8	509.5	269.1	738.2	82.6	51.9	0.	62.0	380.6	1265.3	1004.3	47.8	0.	0.	239.9	0.	1413.
1978	79.2	719.9	290.0	290.3	381.8	99.4	86.5	0.	62.9	151.4	592.4	553.7	38.6	0.	0.	16.2	0.35	1073.
1979	98.4	819.4	403.8	356.8	485.2	76.0	77.0	0.	59.8	228.4	792.3	753.7	39.1	0.	0.	38.6	0.25	1283.
1980	83.6	711.4	276.1	209.1	460.1	109.1	37.7	0.	64.4	171.5	701.7	637.2	64.5	0.	0.	19.2	0.35	1092.
1981	80.1	1018.8	459.6	347.5	560.1	215.2	90.4	0.	63.1	285.3	917.2	870.5	46.7	0.	0.	17.0	0.10	1342.
1982	93.6	644.0	307.0	360.7	307.4	74.6	52.7	0.	58.6	155.7	514.6	466.8	47.8	0.	0.	35.0	0.40	1010.
1983	109.3	1054.0	511.3	433.8	653.7	94.5	46.2	0.	61.1	337.2	1101.0	1055.2	44.2	0.	0.	49.5	0.	1625.
AVERAGE	75.7	861.2	409.2	344.2	496.5	132.4	68.5	0.	63.1	228.8	805.9	746.9	47.0	0.	0.	23.4	0.18	1323.

Target Year 2000

	MUDA DEMAND (A)	MUDA NORTH (D)	DEMAND SOUTH (C)	KEDAH WITHD. (D)	NORTH DEFIC. (E)	JENIANG WITHD. (F)	RELEASE MAK (G)	REMAN (H)	MUDA RELEA. (I)	SOUTH DEFIC. (J)	TOTAL DEFIC. (K)	R E S E R V O I R			REMAN. DEFICIT (O)	CUT RATE (P)	TOTAL OUTPUT (R)	
	(A)	(D)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	PEDU (L)	AHNING (M)	BERIS (N)	T.MUDA (O)	(P)	(Q)	(R)
1981	63.1	957.6	358.7	364.0	511.3	170.2	84.5	0.	63.1	186.3	775.1	696.1	79.0	0.	0.	0.	0.35	1379.
1982	63.5	886.1	313.4	358.1	427.3	174.2	103.4	0.	63.3	154.5	624.3	541.0	83.3	0.	0.	0.	0.40	1263.
1983	85.8	924.0	362.0	208.6	646.6	184.2	43.9	0.	70.2	200.7	941.6	879.1	35.2	0.	0.	40.1	0.45	1332.
1984	85.9	823.1	285.4	288.6	441.1	166.7	82.0	0.	67.9	150.1	656.9	631.5	25.5	0.	0.	18.0	0.50	1176.
1985	79.8	836.7	314.0	380.2	446.5	142.2	29.1	0.	66.1	152.7	665.8	637.2	28.6	0.	0.	13.7	0.50	1217.
1986	63.1	861.8	342.8	426.4	399.1	162.4	75.5	0.	63.1	141.6	600.8	559.6	41.2	0.	0.	0.	0.25	1268.
1987	63.1	1015.9	416.4	518.2	506.3	119.2	87.4	0.	63.1	201.1	766.1	753.3	32.6	0.	0.	0.	0.	1495.
1988	178.0	1122.7	467.1	557.4	608.2	86.9	42.1	0.	62.8	315.1	1025.8	979.1	46.7	0.	0.	115.2	0.	1653.
1989	64.6	913.3	348.0	437.6	441.7	158.9	48.6	0.	64.5	174.5	684.7	641.4	43.3	0.	0.	0.1	0.35	1326.
1990	66.8	1066.0	413.9	430.3	533.8	196.6	91.6	0.	64.3	207.6	823.8	785.2	38.6	0.	0.	2.5	0.	1544.
1971	67.7	1099.3	511.7	646.1	513.2	89.8	74.3	0.	65.1	285.6	889.8	848.0	41.8	0.	0.	2.6	0.	1676.
1972	75.0	1180.9	455.1	536.3	676.9	70.0	34.3	0.	66.2	318.7	1105.9	1058.5	47.4	0.	0.	8.8	0.	1702.
1973	65.6	1043.3	362.0	619.9	397.6	123.7	57.4	0.	65.3	206.7	671.4	640.4	31.0	0.	0.	0.3	0.10	1471.
1974	73.6	1149.9	546.1	554.5	598.6	104.5	65.0	0.	65.7	373.2	1079.8	1033.2	46.7	0.	0.	7.9	0.	1762.
1975	63.1	859.2	335.3	413.2	430.3	150.6	64.0	0.	63.1	156.6	629.9	560.3	69.6	0.	0.	0.0	0.35	1258.
1976	73.1	1086.7	440.0	549.9	537.8	148.0	92.1	0.	65.1	198.9	818.6	780.8	37.7	0.	0.	7.9	0.10	1592.
1977	187.0	1209.6	508.9	351.6	841.9	78.6	57.6	0.	66.1	388.7	1367.4	1077.5	49.5	0.	0.	33.2	0.	1568.
1978	105.6	850.3	270.0	403.4	94.9	94.9	90.7	0.	64.6	132.1	595.0	534.1	60.9	0.	0.	40.9	0.40	1185.
1979	169.6	917.5	358.7	461.3	478.4	72.6	67.0	0.	64.4	190.9	750.3	686.0	64.3	0.	0.	105.2	0.35	1341.
1980	106.3	830.0	265.6	317.8	480.6	101.7	37.0	0.	65.8	158.6	710.2	631.5	78.7	0.	0.	60.5	0.40	1161.
1981	94.0	1196.9	475.1	433.1	633.7	226.1	93.0	0.	64.4	284.1	1019.8	965.9	53.9	0.	0.	29.6	0.10	1754.
1982	153.0	798.8	325.4	353.3	79.1	52.4	52.4	0.	60.6	164.3	575.2	519.1	54.5	0.	0.	93.8	0.40	1181.
1983	146.6	1161.4	463.6	539.1	646.2	88.3	52.6	0.	60.6	296.3	1049.4	996.9	43.6	0.	0.	93.9	0.10	1678.
AVERAGE	95.4	990.9	388.3	445.4	519.9	130.0	66.3	0.	64.6	217.6	819.4	758.1	49.3	0.	0.	41.7	0.22	1433.

Table 49 WATER DEMAND AND SUPPLY BALANCE OF INTEGRATED OPERATION SYSTEM (5/18)

Unit: 10⁶ m³

Sources Facilities: Pedu-Muda, Ahning, Jeniang Case 3 (Kedah Priority)

Target Year 1990

	MUDA DEMAND NORTH (A)	MUDA DEMAND SOUTH (B)	DEMAND SOUTH (C)	KEDAH WITHD. (D)	NORTH DEFIC. (E)	JENIANG WITHD. (F)	RELEASE HAOK (G)	REMAN (H)	MUDA RELEA. (I)	SOUTH DEFIC. (J)	TOTAL DEFIC. (K)	PEDU (L)	RESERVOIR AHNING (M)	RESERVOIR BERIS (N)	T.MUDA (O)	REMAN. DEFICIT (P)	CUT RATE (Q)	TOTAL OUTPUT (R)
1961	63.1	822.4	367.2	269.3	491.5	162.2	87.5	0.	63.1	179.2	745.2	697.7	47.5	0.	0.	0.0	0.35	1253.
1962	63.7	723.3	330.8	262.6	373.0	169.3	107.3	0.	63.7	138.7	571.4	497.2	74.2	0.	0.	0.0	0.40	1117.
1963	64.0	925.8	441.0	150.0	721.2	194.4	44.4	0.	64.0	256.9	1086.7	972.8	56.0	0.	0.	52.1	0.25	1349.
1964	63.8	745.2	314.1	189.3	447.9	170.3	76.2	0.	63.8	175.5	692.7	609.1	83.6	0.	0.	0.	0.40	1123.
1965	63.5	734.1	357.9	292.9	459.6	144.7	28.9	0.	63.5	185.9	717.3	661.4	35.9	0.	0.	0.	0.40	1170.
1966	63.1	696.7	377.6	303.0	359.5	164.6	80.3	0.	63.1	167.0	584.9	545.7	39.2	0.	0.	0.	0.25	1137.
1967	63.1	855.4	438.0	400.1	462.7	125.2	105.5	0.	63.1	199.7	736.2	703.6	32.6	0.	0.	0.0	0.	1356.
1968	67.0	961.4	489.1	440.1	548.2	96.5	47.8	0.	67.0	318.2	962.6	916.8	45.9	0.	0.	5.0	0.	1513.
1969	63.1	819.7	386.0	330.0	463.8	156.2	55.0	0.	63.1	200.7	738.4	698.6	61.7	0.	0.	0.0	0.25	1269.
1970	63.3	944.0	420.3	340.2	515.0	209.1	83.2	0.	63.3	216.9	813.3	772.2	41.1	0.	0.	0.0	0.	1428.
1971	63.1	933.9	522.6	541.8	460.5	96.6	77.5	0.	63.1	280.2	823.0	786.1	36.9	0.	0.	0.0	0.	1520.
1972	63.7	1038.5	457.7	443.3	636.4	72.5	36.5	0.	63.7	307.5	1048.6	1003.7	44.9	0.	0.	0.	0.	1560.
1973	63.1	894.3	398.9	504.4	377.1	133.6	78.1	0.	63.1	199.7	736.2	703.6	32.6	0.	0.	0.0	0.10	1357.
1974	63.5	929.1	544.1	429.0	560.2	104.4	65.4	0.	63.5	376.5	1040.5	995.5	45.0	0.	0.	0.0	0.	1597.
1975	63.1	775.4	370.7	305.0	442.7	157.7	69.0	0.	63.1	171.8	682.7	641.3	41.5	0.	0.	0.0	0.25	1209.
1976	63.7	727.2	437.7	447.0	494.0	143.6	92.5	0.	63.7	189.9	737.6	721.3	36.3	0.	0.	0.	0.10	1429.
1977	66.1	1032.8	509.5	269.1	758.2	82.7	51.9	0.	61.9	380.4	1265.1	1004.1	47.8	0.	196.0	0.	0.	1612.
1978	64.1	719.9	290.0	290.8	381.8	99.3	86.5	0.	62.6	151.0	592.0	553.3	38.6	0.	0.	1.5	0.55	1072.
1979	64.6	319.4	403.8	356.8	485.1	76.1	77.0	0.	59.6	228.2	792.6	753.6	39.0	0.	0.	5.0	0.25	1283.
1980	64.4	711.4	276.1	209.3	460.1	109.7	37.7	0.	63.7	170.8	701.0	636.5	64.5	0.	0.	0.6	0.35	1031.
1981	64.0	1018.8	459.6	347.5	560.1	215.4	90.4	0.	62.9	265.7	914.9	870.2	44.7	0.	0.	1.1	0.10	1543.
1982	64.2	644.0	307.8	360.7	307.4	74.6	52.7	0.	58.6	162.5	572.8	466.8	47.8	0.	0.	5.6	0.40	1010.
1983	65.3	1054.0	511.3	433.3	653.7	94.8	46.2	0.	60.8	336.9	1100.6	1054.9	44.2	0.	0.	5.8	0.	1625.
AVERAGE	63.9	861.2	409.2	344.2	496.5	132.8	68.5	0.	62.7	228.4	805.5	746.6	47.0	0.	0.	11.9	0.18	1322.

Target Year 2000

	MUDA DEMAND NORTH (A)	MUDA DEMAND SOUTH (B)	DEMAND SOUTH (C)	KEDAH WITHD. (D)	NORTH DEFIC. (E)	JENIANG WITHD. (F)	RELEASE HAOK (G)	REMAN (H)	MUDA RELEA. (I)	SOUTH DEFIC. (J)	TOTAL DEFIC. (K)	PEDU (L)	RESERVOIR AHNING (M)	RESERVOIR BERIS (N)	T.MUDA (O)	REMAN. DEFICIT (P)	CUT RATE (Q)	TOTAL OUTPUT (R)
1961	63.1	989.3	371.6	364.0	543.8	174.4	80.3	0.	63.1	198.4	826.7	744.8	79.9	0.	0.	0.	0.30	1424.
1962	63.3	826.1	313.4	358.1	427.3	174.2	105.4	0.	63.3	134.5	624.5	541.0	83.3	0.	0.	0.	0.40	1263.
1963	65.3	886.8	345.6	202.6	607.0	188.0	47.0	0.	65.3	181.8	876.4	819.6	34.1	0.	0.	20.5	0.50	1277.
1964	64.6	823.1	285.4	268.6	441.1	170.0	82.0	0.	64.6	146.8	653.2	627.8	25.5	0.	0.	0.0	0.50	1173.
1965	64.2	826.7	314.0	380.2	466.5	144.0	29.1	0.	64.2	150.9	665.7	635.1	28.6	0.	0.	0.0	0.50	1215.
1966	63.1	886.3	356.4	426.8	422.7	163.1	77.9	0.	63.1	152.2	638.8	597.1	41.6	0.	0.	0.	0.20	1306.
1967	63.1	1015.9	416.4	518.2	506.3	119.2	87.4	0.	63.1	201.1	786.1	753.5	32.6	0.	0.	0.	0.	1495.
1968	68.3	1122.7	467.1	557.4	608.2	88.0	42.1	0.	61.7	315.9	1024.6	977.8	46.7	0.	6.6	0.	0.	1651.
1969	63.3	943.3	363.0	437.6	474.2	160.8	47.8	0.	63.3	185.9	733.5	685.6	43.9	0.	0.	0.0	0.30	1370.
1970	63.3	1066.0	413.9	450.3	535.8	197.6	91.6	0.	63.3	206.6	822.7	784.1	38.6	0.	0.	0.	0.	1543.
1971	63.7	1099.3	511.7	646.1	515.2	91.1	74.3	0.	63.7	284.3	888.3	846.6	41.8	0.	0.	0.0	0.	1675.
1972	64.4	1180.9	455.1	536.3	676.4	71.9	34.3	0.	64.4	317.1	1103.8	1058.4	47.4	0.	0.	0.0	0.	1700.
1973	63.7	985.3	334.7	612.2	354.1	123.6	54.2	0.	63.7	175.9	588.9	558.8	30.1	0.	0.	0.	0.20	1384.
1974	63.8	1149.9	546.1	554.5	598.6	106.4	65.0	0.	63.8	371.5	1077.7	1031.1	46.7	0.	0.	0.	0.	1760.
1975	63.1	886.7	348.4	413.2	458.6	150.6	64.0	0.	63.1	148.7	674.8	631.0	43.8	0.	0.	0.0	0.30	1298.
1976	64.1	1066.7	460.0	549.9	537.8	149.0	92.1	0.	64.1	197.9	817.5	779.7	37.7	0.	0.	0.0	0.10	1591.
1977	68.0	1209.6	508.9	351.6	841.9	81.7	57.8	0.	62.8	385.5	1363.8	1074.9	49.5	0.	220.5	0.	0.	1566.
1978	64.8	850.3	270.0	399.2	402.9	96.7	90.7	0.	62.9	130.9	593.1	532.1	60.9	0.	0.	1.9	0.40	1183.
1979	67.3	948.3	373.1	461.3	506.0	77.7	66.3	0.	60.6	209.9	795.4	628.0	63.2	0.	0.	100.7	0.50	1285.
1980	65.2	889.9	291.1	317.8	542.3	106.3	33.9	0.	64.3	180.6	803.3	723.3	79.2	0.	0.	1.7	0.30	1285.
1981	64.7	1196.9	475.1	453.1	633.7	227.2	93.0	0.	63.3	283.0	1078.6	969.7	53.9	0.	0.	0.4	0.10	1733.
1982	66.1	798.8	325.4	473.0	353.3	81.2	52.4	0.	58.5	162.5	572.8	513.9	54.5	0.	0.	11.5	0.40	1177.
1983	65.7	1161.4	463.6	539.1	648.2	89.1	32.6	0.	60.3	295.9	1049.0	994.9	43.6	0.	0.	13.0	0.10	1676.
AVERAGE	64.6	995.7	390.7	445.1	525.2	131.8	66.1	0.	63.1	218.1	825.9	761.1	48.1	0.	0.	16.5	0.21	1434.

Table 50

WATER DEMAND AND SUPPLY BALANCE
OF INTEGRATED OPERATION SYSTEM (6/18)

Unit: 10⁶ m³

Sources Facilities: Pedu-Muda, Ahning, Jeniang, Beris
Case 1 (Muda Priority)

Target Year 1990

	RUAF DEMAND (A)	HADA NORTH (B)	DEMAND SOUTH (C)	KEDAH WITHD. (D)	NORTH DEFIC. (E)	JENIANG WITHD. (F)	RELEASE MAOK (G)	REMAN (H)	MUDA RELEA. (I)	SOUTH DEFIC. (J)	TOTAL DEFIC. (K)	PEDU (L)	R E S E R V O I R AHNING (M)	B E R I S (N)	T.MUDA (O)	REMAIN. DEFICIT (P)	CUT RATE (Q)	TOTAL OUTPUT (R)
1961	55.1	384.8	394.1	229.5	558.5	150.1	76.9	0.	63.1	238.8	883.7	733.5	49.8	100.4	0.	0.0	0.25	1342.
1962	63.1	786.2	363.4	263.0	456.9	156.3	100.1	0.	63.1	194.2	719.0	551.6	83.1	84.3	0.	0.	0.30	1213.
1963	67.4	389.2	423.9	150.0	677.3	161.3	36.1	0.	64.0	271.4	1076.3	871.8	88.4	76.4	0.	55.7	0.30	1345.
1964	69.8	745.2	314.3	189.3	462.1	139.2	67.9	0.	64.3	206.1	742.5	607.8	28.7	104.2	0.	0.	0.40	1129.
1965	68.0	316.1	357.9	292.7	536.2	116.5	28.6	0.	64.2	233.5	855.3	735.7	31.1	85.0	0.	3.1	0.30	1252.
1966	63.1	766.1	421.1	394.0	437.1	176.9	84.2	0.	63.1	225.9	736.7	564.6	43.5	128.0	0.	0.	0.10	1252.
1967	65.1	951.4	439.1	400.1	464.8	100.1	102.9	0.	63.1	225.5	766.9	628.5	33.3	105.2	0.	0.0	0.	1356.
1968	63.1	989.7	465.6	370.6	524.8	128.2	47.4	0.	59.3	334.7	1043.0	907.2	47.3	88.6	0.	0.	0.	1504.
1969	63.1	989.7	465.6	370.6	524.8	128.2	47.4	0.	63.1	303.5	1031.4	896.8	43.0	91.6	0.	0.0	0.	1498.
1970	63.5	944.0	420.3	346.2	528.9	172.1	73.2	0.	63.5	246.0	858.8	683.5	43.2	132.1	0.	0.0	0.	1428.
1971	63.1	933.9	522.6	541.3	461.5	76.7	75.6	0.	63.1	301.0	847.2	700.0	38.0	109.1	0.	0.0	0.	1520.
1972	67.2	1028.5	637.7	443.2	637.7	53.5	33.5	0.	64.5	328.9	1076.3	935.0	46.1	95.1	0.	0.	0.	1563.
1973	63.1	952.5	628.5	510.5	477.5	113.1	86.7	0.	63.1	243.1	745.1	612.4	33.0	99.7	0.	0.	0.	1444.
1974	66.6	929.1	544.1	426.0	564.0	11.1	60.5	0.	64.4	400.9	1072.1	919.0	45.9	107.2	0.	0.0	0.	1600.
1975	63.1	952.5	628.5	510.5	477.5	113.1	86.7	0.	63.1	266.6	946.4	826.6	42.8	77.0	0.	0.0	0.	1414.
1976	66.7	938.2	466.0	448.2	511.2	117.5	85.9	0.	63.8	243.0	894.2	743.5	38.2	112.5	0.	0.0	0.	1521.
1977	110.0	1032.8	509.5	249.1	762.9	64.2	52.0	0.	60.2	437.3	1333.5	1024.0	49.5	109.0	0.	135.9	0.	1516.
1978	77.2	750.9	304.8	291.1	429.2	70.3	77.7	0.	61.3	284.7	693.2	541.0	66.2	86.7	0.	0.0	0.30	1135.
1979	98.4	819.4	403.2	356.2	496.5	62.7	59.2	0.	57.5	189.0	872.8	668.5	40.4	84.8	0.	71.2	0.25	1251.
1980	83.6	741.0	289.5	229.3	503.1	92.9	30.7	0.	62.8	215.4	798.3	651.8	70.5	76.0	0.	0.	0.30	1114.
1981	80.1	1082.5	491.1	346.4	624.6	191.3	92.8	0.	62.4	333.7	1064.8	867.6	49.4	147.8	0.	0.	0.	1654.
1982	93.6	698.3	337.8	367.8	359.9	62.6	52.1	0.	56.9	224.5	647.3	540.0	50.2	59.1	0.	0.0	0.30	1130.
1983	109.7	1054.0	511.3	433.6	659.3	75.6	43.5	0.	59.5	401.0	1178.1	1014.4	45.6	118.1	0.	0.0	0.	1675.
AVERAGE	75.7	696.2	427.2	345.0	536.2	109.2	64.6	0.	62.3	278.5	908.1	748.9	48.2	99.1	0.	10.7	0.12	1388.

Target Year 2000

	RUAF DEMAND (A)	HADA NORTH (B)	DEMAND SOUTH (C)	KEDAH WITHD. (D)	NORTH DEFIC. (E)	JENIANG WITHD. (F)	RELEASE MAOK (G)	REMAN (H)	MUDA RELEA. (I)	SOUTH DEFIC. (J)	TOTAL DEFIC. (K)	PEDU (L)	R E S E R V O I R AHNING (M)	B E R I S (N)	T.MUDA (O)	REMAIN. DEFICIT (P)	CUT RATE (Q)	TOTAL OUTPUT (R)
1961	63.1	389.3	371.6	364.0	556.2	142.9	74.0	0.	63.1	223.8	866.7	683.1	82.1	101.5	0.	0.	0.30	1424.
1962	63.2	930.7	343.7	359.1	515.2	141.8	92.6	0.	63.3	179.7	772.0	619.4	66.5	86.1	0.	0.	0.30	1358.
1963	85.6	823.1	265.4	296.6	628.6	150.1	32.6	0.	67.1	225.3	948.7	763.2	31.8	74.7	0.	71.1	0.50	1247.
1964	85.6	823.1	265.4	296.6	628.6	150.1	32.6	0.	65.9	189.3	719.9	587.8	25.5	107.1	0.	0.	0.50	1195.
1965	79.8	899.9	342.5	380.2	532.4	117.8	24.7	0.	64.9	202.4	816.4	702.9	28.6	85.0	0.	0.0	0.40	1322.
1966	63.1	983.7	410.9	426.3	525.9	133.6	28.6	0.	63.1	218.2	826.8	654.4	44.8	127.6	0.	0.	0.	1458.
1967	63.1	1015.9	416.4	518.2	509.1	95.3	69.0	0.	63.1	220.8	810.9	672.3	32.6	106.1	0.	0.	0.	1495.
1968	178.0	1122.7	467.1	537.4	615.4	71.6	40.3	0.	59.1	444.0	1177.1	1039.9	48.0	89.2	0.	0.0	0.	1768.
1969	64.6	1003.4	393.2	437.6	549.9	131.6	41.8	0.	64.1	236.4	873.6	710.2	74.9	88.5	0.	0.0	0.20	1461.
1970	66.2	1066.0	413.9	450.3	548.1	170.1	73.0	0.	63.9	236.4	871.6	712.7	40.2	118.7	0.	0.	0.	1547.
1971	67.7	1099.3	511.7	640.1	517.1	69.6	73.4	0.	64.2	308.4	917.2	757.3	42.2	117.7	0.	0.0	0.	1679.
1972	75.0	1180.9	453.1	536.3	677.7	52.3	31.3	0.	65.2	444.0	1177.1	996.6	47.4	95.2	0.	0.0	0.	1711.
1973	65.6	1101.3	387.3	620.3	450.3	106.1	61.9	0.	64.9	242.6	789.9	636.1	34.7	99.1	0.	0.0	0.	1556.
1974	73.6	1149.9	546.1	554.5	682.8	82.6	62.5	0.	64.7	402.4	1116.9	962.1	46.7	108.2	0.	0.	0.	1769.
1975	63.1	1051.7	425.6	413.2	631.7	122.6	63.2	0.	63.1	246.7	976.0	857.4	44.0	74.6	0.	0.0	0.	1540.
1976	73.1	1150.5	468.4	551.5	612.1	121.6	85.8	0.	64.3	256.6	965.3	803.7	40.4	114.1	0.	6.4	0.	1686.
1977	187.0	1209.6	508.9	351.6	247.9	62.5	60.0	0.	61.9	521.6	1521.7	1053.9	52.2	113.2	0.	272.2	0.	1633.
1978	105.6	912.2	296.9	399.6	476.1	77.5	82.0	0.	62.4	215.6	770.8	550.0	65.5	80.1	0.	67.8	0.30	1247.
1979	169.2	948.3	373.1	461.3	519.9	61.9	49.2	0.	60.7	338.0	953.2	679.2	68.2	87.6	0.	106.4	0.30	1385.
1980	106.7	889.9	291.1	317.8	533.9	86.7	30.4	0.	63.5	235.6	877.3	611.9	78.5	76.1	0.	99.7	0.30	1188.
1981	94.0	1262.4	504.9	435.3	704.1	200.3	91.6	0.	63.4	369.0	1192.4	847.3	56.3	154.9	0.	120.5	0.	1742.
1982	153.0	852.8	354.0	478.6	405.9	71.7	54.4	0.	58.1	291.2	774.5	594.0	37.5	51.7	0.	64.2	0.30	1290.
1983	146.6	1233.1	498.8	539.1	724.6	73.4	48.2	0.	58.8	434.2	1287.6	1031.0	45.7	118.2	0.	83.4	0.	1795.
AVERAGE	95.4	1034.1	409.3	446.2	572.5	108.2	62.5	0.	63.2	286.3	954.2	762.0	50.2	98.9	0.	38.8	0.15	1500.

Table 51

WATER DEMAND AND SUPPLY BALANCE
OF INTEGRATED OPERATION SYSTEM (7/18)

Unit: 10⁶ m³

Sources Facilities: Pedu-Muda, Ahning, Jeniang, Beris
Case 2 (Intermediate)

Target Year 1990

	MUDA DEMAND		HADA DEMAND		KEDAH WITHD.		NORTH DEFIC.		JENIANG WITHD.		RELEASE		MUDA SOUTH TOTAL		RESERVOIR				REMAIN.		CUT TOTAL	
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)	(P)	(Q)	(R)	(S)	(T)	(U)	(V)
1961	63.1	1040.7	461.4	269.5	701.6	151.9	62.2	0.	63.1	317.0	1151.7	968.0	55.4	100.9	0.	0.0	0.	0.0	0.	0.0	0.40	1117.
1962	63.1	723.3	330.8	262.6	392.3	157.5	101.4	0.	63.1	160.2	613.9	452.0	79.7	82.2	0.	0.0	0.40	0.35	0.	0.0	0.40	1117.
1963	66.7	852.5	406.8	450.0	659.8	161.0	36.1	0.	64.6	254.5	1015.8	820.2	64.1	78.2	0.	0.0	0.40	0.35	0.	0.0	0.45	1076.
1964	67.1	711.5	297.1	189.2	427.3	137.7	69.5	0.	64.5	187.7	683.4	549.4	28.7	105.5	0.	0.0	0.40	0.35	0.	0.0	0.45	1076.
1965	66.2	816.1	387.9	292.9	536.2	116.5	28.0	0.	64.2	251.7	853.3	736.5	51.1	85.7	0.	0.0	0.40	0.35	0.	0.0	0.30	1270.
1966	63.1	815.8	450.0	304.8	483.4	139.9	85.0	0.	63.1	252.9	818.1	644.0	43.9	130.1	0.	0.0	0.40	0.35	0.	0.0	0.40	1329.
1967	63.1	855.4	438.0	460.1	464.8	100.1	102.9	0.	63.1	225.5	766.9	628.5	33.3	105.2	0.	0.0	0.40	0.35	0.	0.0	0.40	1356.
1968	91.2	961.4	489.1	440.1	554.0	81.0	44.6	0.	59.3	362.6	1018.5	882.6	47.3	88.6	0.	0.0	0.40	0.35	0.	0.0	0.40	1542.
1969	63.1	969.7	465.6	330.6	624.8	128.9	47.4	0.	63.1	303.5	1051.4	896.8	43.0	91.6	0.	0.0	0.40	0.35	0.	0.0	0.40	1498.
1970	63.5	944.0	420.3	340.2	526.9	178.1	73.2	0.	63.5	246.0	858.8	683.5	43.2	132.1	0.	0.0	0.40	0.35	0.	0.0	0.40	1428.
1971	63.1	933.9	322.6	541.8	461.5	76.7	75.6	0.	63.1	301.0	847.2	700.0	38.0	109.1	0.	0.0	0.40	0.35	0.	0.0	0.40	1520.
1972	66.8	1038.5	457.7	443.3	639.7	55.5	35.5	0.	64.5	328.5	1075.8	934.6	46.1	95.1	0.	0.0	0.40	0.35	0.	0.0	0.40	1563.
1973	63.1	952.5	428.5	510.5	427.5	113.1	86.7	0.	63.1	245.1	745.1	612.4	55.0	99.7	0.	0.0	0.40	0.35	0.	0.0	0.40	1444.
1974	66.6	989.1	544.1	429.0	564.0	81.1	60.5	0.	64.4	400.9	1072.1	919.0	45.9	107.2	0.	0.0	0.40	0.35	0.	0.0	0.40	1600.
1975	63.1	910.3	440.7	305.0	585.1	128.6	65.8	0.	63.1	266.6	946.4	826.6	42.8	77.0	0.	0.0	0.40	0.35	0.	0.0	0.40	1414.
1976	66.7	988.2	466.0	446.8	561.8	117.5	85.9	0.	63.8	242.9	894.1	743.5	38.2	112.5	0.	0.0	0.40	0.35	0.	0.0	0.40	1521.
1977	83.4	1032.8	509.5	289.1	762.9	64.9	58.0	0.	60.2	410.7	1304.0	1131.2	49.5	109.4	0.	0.0	0.40	0.35	0.	0.0	0.35	1613.
1978	70.5	719.9	290.0	290.8	598.1	49.7	78.2	0.	61.3	172.1	633.7	481.2	66.2	86.2	0.	0.0	0.40	0.35	0.	0.0	0.30	1250.
1979	74.1	729.3	369.2	356.6	468.4	62.0	59.8	0.	57.5	248.0	796.0	646.1	63.0	84.8	0.	0.0	0.40	0.35	0.	0.0	0.30	1250.
1980	72.2	741.0	269.5	209.3	503.1	92.9	30.7	0.	62.8	204.0	785.7	659.2	70.5	76.0	0.	0.0	0.40	0.35	0.	0.0	0.40	1644.
1981	69.9	1082.5	491.1	368.4	624.6	191.8	92.8	0.	62.4	321.5	1053.5	856.5	49.4	147.8	0.	0.0	0.40	0.35	0.	0.0	0.40	1644.
1982	72.1	671.2	322.4	364.3	538.4	66.3	51.0	0.	56.9	188.8	585.8	476.7	50.0	59.1	0.	0.0	0.40	0.35	0.	0.0	0.35	1066.
1983	79.7	1054.0	511.5	433.8	659.5	75.6	45.5	0.	59.5	371.4	1145.2	983.5	45.6	118.3	0.	0.0	0.40	0.35	0.	0.0	0.40	1645.
AVERAGE	68.2	895.4	426.5	344.8	537.6	110.3	64.1	0.	62.5	271.4	899.0	748.5	48.3	99.2	0.	0.0	0.40	0.35	0.	0.0	0.12	1386.

Target Year 2000

	MUDA DEMAND		HADA DEMAND		KEDAH WITHD.		NORTH DEFIC.		JENIANG WITHD.		RELEASE		MUDA SOUTH TOTAL		RESERVOIR				REMAIN.		CUT TOTAL	
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)	(P)	(Q)	(R)	(S)	(T)	(U)	(V)
1961	63.1	929.3	371.6	364.0	556.2	142.9	74.0	0.	63.1	223.8	866.7	683.1	82.1	101.5	0.	0.0	0.30	0.30	0.	0.0	0.30	1424.
1962	63.1	950.7	343.7	359.1	515.2	141.8	98.6	0.	63.3	179.7	772.0	622.7	63.2	86.1	0.	0.0	0.30	0.30	0.	0.0	0.30	1358.
1963	79.1	886.8	345.6	208.6	628.6	156.1	32.6	0.	67.1	218.6	941.3	771.8	31.8	74.7	0.	0.0	0.30	0.30	0.	0.0	0.50	1255.
1964	73.5	823.1	285.4	268.6	458.7	137.2	74.7	0.	65.9	176.9	706.2	574.0	25.5	107.1	0.	0.0	0.30	0.30	0.	0.0	0.50	1182.
1965	70.6	899.9	362.5	380.2	532.4	117.8	24.7	0.	64.9	195.2	806.2	692.6	28.6	85.0	0.	0.0	0.40	0.30	0.	0.0	0.40	1313.
1966	63.1	963.7	410.9	428.3	525.9	133.6	88.6	0.	63.1	218.2	826.8	654.4	44.8	127.6	0.	0.0	0.40	0.30	0.	0.0	0.40	1458.
1967	63.1	1015.9	416.4	518.2	509.1	95.3	89.0	0.	63.1	220.8	810.9	672.3	32.6	106.1	0.	0.0	0.40	0.30	0.	0.0	0.40	1495.
1968	103.6	1122.7	467.1	537.4	615.4	71.6	40.3	0.	59.1	369.5	1094.4	957.1	48.0	89.2	0.	0.0	0.40	0.30	0.	0.0	0.40	1693.
1969	64.6	1123.5	453.5	437.6	672.2	133.0	40.3	0.	64.1	294.5	1074.1	936.8	46.1	91.2	0.	0.0	0.40	0.30	0.	0.0	0.40	1642.
1970	64.8	1066.0	413.9	450.3	548.1	170.1	78.0	0.	63.9	234.4	869.4	712.8	40.2	116.3	0.	0.0	0.40	0.30	0.	0.0	0.40	1545.
1971	67.0	1099.3	511.7	446.1	517.1	69.6	73.4	0.	64.2	307.7	916.4	756.5	42.2	117.7	0.	0.0	0.40	0.30	0.	0.0	0.40	1678.
1972	68.9	1180.9	455.1	536.3	679.7	52.3	31.8	0.	65.2	339.5	1132.5	989.8	47.4	95.2	0.	0.0	0.40	0.30	0.	0.0	0.40	1705.
1973	65.6	1101.3	389.3	626.3	450.3	108.1	63.9	0.	64.9	242.6	769.9	636.1	34.7	99.1	0.	0.0	0.40	0.30	0.	0.0	0.40	1556.
1974	68.3	1149.9	546.1	554.5	602.8	82.6	62.5	0.	64.7	397.1	1111.0	956.1	46.7	108.2	0.	0.0	0.40	0.30	0.	0.0	0.40	1764.
1975	63.1	1051.7	425.6	413.2	631.7	122.6	63.2	0.	63.1	246.7	976.0	857.4	44.0	74.6	0.	0.0	0.40	0.30	0.	0.0	0.40	1540.
1976	68.1	1022.9	411.6	548.2	462.7	117.8	85.8	0.	64.3	203.8	762.3	605.8	39.1	117.8	0.	0.0	0.40	0.30	0.	0.0	0.20	1503.
1977	100.9	1209.6	508.9	351.6	347.9	62.5	60.0	0.	61.9	435.5	1426.1	1096.6	52.2	113.2	0.	0.0	0.40	0.30	0.	0.0	0.40	1672.
1978	75.5	912.8	296.9	399.6	478.1	77.5	82.0	0.	62.4	185.6	737.4	590.5	66.7	80.2	0.	0.0	0.40	0.30	0.	0.0	0.30	1285.
1979	92.9	948.3	373.1	461.3	519.9	61.7	49.2	0.	60.7	261.3	868.0	633.7	68.8	87.6	0.	0.0	0.40	0.30	0.	0.0	0.30	1344.
1980	77.5	829.9	291.1	317.8	553.9	86.0	30.4	0.	63.5	206.8	845.3	678.9	80.2	77.1	0.	0.0	0.40	0.30	0.	0.0	0.30	1250.
1981	73.1	1263.4	504.9	433.8	704.1	200.3	91.6	0.	63.4	348.2	1169.2	951.6	56.4	157.9	0.	0.0	0.40	0.30	0.	0.0	0.40	1835.
1982	86.0	852.8	354.0	478.6	405.9	71.7	54.4	0.	58.1	224.1	700.0	522.2	57.5	48.8	0.	0.0	0.40	0.30	0.	0.0	0.30	1229.
1983	82.7	1233.1	498.8	539.1	724.6	73.4	48.2	0.	58.8	370.3	1216.6	1006.2	45.7	118.2	0.	0.0	0.40	0.30	0.	0.0	0.40	1773.
AVERAGE	73.8	1033.8	409.5	446.0	572.2	108.1	62.5	0.	63.2	265.2	938.4	743.4	48.9	99.1	0.	0.0	0.40	0.35	0.	0.0	0.15	1500.

Table 52

WATER DEMAND AND SUPPLY BALANCE
OF INTEGRATED OPERATION SYSTEM (8/18)Unit: 10⁶ m³Sources Facilities: Pedu-Muda, Ahning, Jeniang, Beris
Case 3 (Kedah Priority)

Target Year 1990

	MUDA DEMAND (A)	MUDA NORTH (B)	DEMAND SOUTH (C)	KEDAH WITHD. (D)	NORTH DEFIC. (E)	JENIANG WITHD. (F)	RELEASE		MUDA RELEA. (I)	SOUTH DEFIC. (J)	TOTAL DEFIC. (K)	R E S E R V O I R			REMAIN. DEFICIT (P)	CUT RATE (Q)	TOTAL OUTPUT (R)	
							HAOK (G)	REMAN (H)				PEDU (L)	AHNING (M)	BERIS (N)				
1961	63.1	1040.7	461.4	269.5	701.6	151.7	62.2	0.	63.1	3174.0	1131.7	972.9	55.5	100.9	0.	2.2	U.	1503.
1962	63.1	723.3	330.8	262.6	392.3	137.5	101.4	0.	63.1	180.2	613.9	452.0	79.7	82.2	0.	0.0	U.40	1117.
1963	64.0	852.5	406.8	150.0	659.8	161.7	36.1	0.	63.9	251.7	1012.8	835.6	63.8	78.2	0.	31.7	U.35	1292.
1964	63.2	711.5	277.1	189.2	427.3	158.2	69.5	0.	63.8	184.4	629.7	545.7	28.7	105.5	0.	0.	U.45	1073.
1965	63.5	816.1	387.9	292.9	536.2	117.1	28.6	0.	63.5	229.1	850.5	735.6	31.1	85.7	0.	0.	U.50	1268.
1966	63.1	815.8	450.0	304.3	463.4	159.9	85.0	0.	63.1	252.9	818.1	644.0	43.9	130.1	0.	0.0	U.	1329.
1967	63.1	635.4	438.0	100.1	464.8	100.1	102.9	0.	63.1	225.5	766.9	628.5	33.3	105.2	0.	0.0	U.	1356.
1968	67.9	921.4	489.1	440.1	554.0	81.0	44.6	0.	59.5	538.4	991.6	855.7	47.3	88.6	0.	0.	U.	1518.
1969	63.1	929.7	465.6	350.0	624.8	128.9	47.5	0.	63.1	305.5	1031.4	896.8	43.0	91.6	0.	0.0	U.	1498.
1970	63.1	944.0	420.3	360.2	526.9	178.4	75.2	0.	63.3	245.8	858.6	685.3	43.2	132.1	0.	0.0	U.	1428.
1971	63.1	953.9	522.6	541.5	461.5	76.7	75.0	0.	63.1	301.0	847.2	700.0	38.0	109.1	0.	0.0	U.	1520.
1972	63.7	1038.5	457.7	443.3	639.7	54.3	33.5	0.	63.7	325.4	1072.4	931.1	46.1	95.1	0.	0.0	U.	1560.
1973	65.1	952.5	428.5	510.5	427.5	113.1	66.7	0.	63.1	245.1	745.1	612.4	33.0	99.7	0.	0.	U.	1444.
1974	63.5	989.1	544.1	429.0	544.0	31.9	60.5	0.	63.5	377.8	1008.7	915.6	45.9	107.2	0.	0.0	U.	1597.
1975	63.1	910.3	440.7	305.0	585.1	128.6	65.8	0.	63.1	266.6	946.4	826.6	42.8	77.0	0.	0.0	U.	1414.
1976	63.7	988.2	466.0	448.3	561.8	117.7	85.9	0.	63.7	240.0	890.8	740.1	38.2	112.5	0.	0.0	U.	1518.
1977	66.1	1032.3	509.5	269.1	762.9	64.9	58.0	0.	60.2	395.3	1284.7	1121.4	49.5	109.4	0.	3.9	U.	1605.
1978	64.1	719.9	290.0	290.8	398.1	79.7	78.2	0.	61.3	165.3	626.6	474.1	66.2	86.2	0.	0.0	U.35	1074.
1979	64.6	789.3	389.2	356.8	468.4	62.0	59.8	0.	57.5	238.6	785.5	635.6	65.0	84.8	0.	0.	U.	1243.
1980	64.4	741.0	289.5	209.3	503.1	93.0	30.7	0.	62.6	196.1	777.0	630.5	70.5	76.0	0.	0.	U.50	1095.
1981	64.0	1022.5	491.1	368.4	624.6	191.3	92.3	0.	62.4	317.6	1066.9	849.7	49.4	147.8	0.	0.	U.	1658.
1982	64.2	696.3	337.8	367.3	559.9	68.6	52.1	0.	56.9	195.1	616.7	507.3	50.2	59.1	0.	0.	U.50	1100.
1983	65.5	1054.0	511.5	435.8	659.3	75.6	45.5	0.	59.5	357.0	1129.2	965.5	45.6	118.1	0.	0.0	U.	1631.
AVERAGE	63.9	896.5	427.2	345.0	538.6	110.5	64.7	0.	62.2	267.2	895.3	746.0	48.3	99.2	0.	1.6	U.12	1386.

Target Year 2000

	MUDA DEMAND (A)	MUDA NORTH (B)	DEMAND SOUTH (C)	KEDAH WITHD. (D)	NORTH DEFIC. (E)	JENIANG WITHD. (F)	RELEASE		MUDA RELEA. (I)	SOUTH DEFIC. (J)	TOTAL DEFIC. (K)	R E S E R V O I R			REMAIN. DEFICIT (P)	CUT RATE (Q)	TOTAL OUTPUT (R)	
							HAOK (G)	REMAN (H)				PEDU (L)	AHNING (M)	BERIS (N)				
1961	63.1	1052.6	397.5	364.0	614.0	148.5	68.4	0.	63.1	254.8	966.0	777.4	87.3	100.9	0.	0.3	0.20	1513.
1962	63.3	950.7	343.7	359.1	515.2	141.8	98.6	0.	63.3	179.7	772.0	608.4	59.0	85.8	0.	16.9	0.30	1341.
1963	65.3	866.8	345.6	208.6	628.6	158.1	32.6	0.	65.1	204.7	925.9	717.6	31.8	75.3	0.	91.1	0.50	1207.
1964	64.6	823.1	285.4	268.6	458.7	136.5	74.7	0.	64.6	168.0	696.3	564.1	25.5	107.1	0.	0.	0.50	1173.
1965	64.2	899.9	342.5	320.2	532.4	118.4	24.7	0.	64.2	186.3	799.1	685.6	28.6	85.0	0.	0.0	0.40	1307.
1966	63.1	923.7	410.9	428.3	525.9	133.6	88.6	0.	63.1	218.2	826.8	654.4	44.8	127.6	0.	0.	0.	1458.
1967	63.1	1015.9	416.4	518.2	509.1	95.3	89.0	0.	63.1	220.8	810.9	672.3	32.6	106.1	0.	0.	0.	1495.
1968	68.3	1122.7	467.1	537.4	615.4	72.0	40.3	0.	58.6	334.3	1055.2	917.9	48.0	89.2	0.	0.0	0.	1658.
1969	63.3	1123.5	453.5	437.6	672.2	133.8	40.3	0.	63.3	293.1	1072.6	935.3	66.1	91.2	0.	0.0	0.	1640.
1970	63.2	1066.0	415.9	450.3	548.1	170.7	78.0	0.	61.3	232.9	867.7	711.2	40.2	116.3	0.	0.	0.	1543.
1971	63.7	1099.3	511.7	646.1	517.1	70.1	73.4	0.	63.7	304.4	912.8	752.9	42.2	117.7	0.	0.0	0.	1675.
1972	64.4	1180.9	455.1	536.3	679.7	53.1	31.8	0.	64.4	335.0	1127.4	984.8	47.4	95.2	0.	0.0	0.	1700.
1973	63.7	1101.3	389.3	626.3	450.3	109.3	63.9	0.	63.7	240.7	767.8	634.0	34.7	99.1	0.	0.0	0.	1554.
1974	63.2	1149.9	546.1	554.5	602.8	83.5	62.5	0.	63.8	392.6	1106.0	951.2	46.7	108.2	0.	0.	0.	1760.
1975	63.1	1051.7	425.6	413.2	631.7	122.6	63.2	0.	63.1	246.7	976.0	857.4	44.0	74.6	0.	0.0	0.	1540.
1976	64.1	1150.5	468.4	551.5	612.1	121.8	85.8	0.	64.0	247.7	955.3	798.5	40.4	114.1	0.	2.1	0.	1681.
1977	68.0	1209.6	508.9	351.6	847.9	63.6	60.0	0.	60.8	402.6	1389.4	1053.5	32.2	113.1	0.	153.6	0.	1633.
1978	64.8	912.8	296.9	399.6	477.6	78.5	82.0	0.	61.4	175.4	725.6	524.5	65.7	80.1	0.	49.8	0.30	1225.
1979	67.3	948.3	373.1	461.3	519.8	64.5	49.2	0.	58.1	235.8	839.6	608.0	68.8	87.6	0.	67.7	0.30	1321.
1980	65.2	889.9	291.1	317.8	553.7	86.4	30.6	0.	63.1	194.8	831.7	668.9	80.2	77.5	0.	4.6	0.30	1242.
1981	64.7	1263.4	504.9	435.8	704.1	201.0	91.6	0.	62.7	339.7	1159.8	945.9	56.4	156.4	0.	1.0	0.	1832.
1982	66.1	852.8	354.0	478.6	405.9	73.0	54.4	0.	56.8	204.2	677.9	512.5	57.5	50.3	0.	51.8	0.50	1221.
1983	65.7	1233.1	498.8	539.1	724.6	73.4	48.2	0.	58.8	353.6	1197.8	1015.3	45.7	118.5	0.	16.4	0.	1781.
AVERAGE	64.6	1042.1	413.1	446.2	580.3	109.2	62.2	0.	62.4	259.4	935.0	763.1	48.9	99.0	0.	19.8	0.13	1500.

Table 53

WATER DEMAND AND SUPPLY BALANCE
OF INTEGRATED OPERATION SYSTEM (9/18)

Unit: 106 m³

Sources Facilities: Pedu-Muda, Ahning, Jeniang, Beris, Reman
Case 1 (Muda Priority)

Target Year 1990

	MUDA DEMAND (A)	MUDA NORTH (B)	DEMAND SOUTH (C)	KEDAH WITHD. (D)	NORTH DEFIC. (E)	JENIANG WITHD. (F)	RELEASE NAOK (G)	REMAN (H)	MUDA RELEA. (I)	SOUTH DEFIC. (J)	TOTAL DEFIC. (K)	R E S E R V O I R			REMAN. DEFICIT (P)	CUT RATE (Q)	TOTAL OUTPUT (R)	
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	PEDU (L)	AHNING (M)	BERIS (N)	T. MUDA (O)	(P)	(Q)	(R)
1961	65.1	1040.7	401.4	249.5	645.4	151.9	99.0	190.1	63.1	146.3	879.7	733.3	52.0	94.3	0.	0.0	0.	1563.
1962	63.1	912.2	429.7	265.7	523.5	141.4	107.4	162.7	63.1	135.2	737.4	629.3	44.8	63.3	0.	0.0	0.10	1404.
1963	67.4	1108.8	526.6	150.0	203.8	161.0	38.8	102.4	64.6	282.2	1317.8	1097.7	56.0	98.3	0.	59.2	0.	1644.
1964	69.8	947.6	415.7	189.3	662.0	146.9	63.5	170.7	64.3	156.2	886.8	698.6	87.1	101.2	0.	0.	0.10	1433.
1965	68.0	940.0	448.0	292.9	650.5	116.7	31.2	116.3	64.2	184.2	927.4	709.4	84.7	91.3	0.	37.8	0.10	1418.
1966	63.1	768.1	421.1	374.0	353.3	126.0	142.3	228.9	63.1	16.7	411.1	379.0	32.1	0.	0.	0.	0.10	1252.
1967	63.1	855.4	438.0	400.1	438.4	100.1	123.9	190.1	63.1	40.7	532.3	502.5	29.8	0.	0.	0.0	0.	1356.
1968	113.3	951.4	489.1	443.1	530.5	81.0	54.0	206.3	59.3	194.6	805.6	659.3	44.7	101.6	0.	0.0	0.	1564.
1969	63.1	969.7	465.6	330.6	604.7	128.7	57.4	157.3	63.1	155.9	845.1	716.7	41.7	86.7	0.	0.0	0.	1498.
1970	63.5	944.0	420.3	340.2	477.2	176.1	85.0	229.4	63.5	54.4	590.7	541.3	36.5	13.0	0.	0.0	0.	1428.
1971	63.1	923.9	522.6	541.8	416.3	76.7	113.5	224.0	63.1	82.2	556.1	500.7	28.0	27.4	0.	0.0	0.	1520.
1972	67.2	1028.5	457.7	443.3	577.5	53.5	71.8	192.5	64.3	160.4	819.9	680.7	41.2	98.0	0.	0.	0.	1563.
1973	63.1	952.5	428.5	510.5	385.4	113.1	108.4	216.0	63.1	47.6	481.1	438.8	28.6	13.7	0.	0.	0.	1444.
1974	66.6	989.1	544.1	429.0	556.7	81.1	69.0	206.8	64.4	196.6	837.3	688.0	45.9	103.3	0.	0.0	0.	1564.
1975	63.1	910.3	440.7	305.0	547.1	128.6	77.2	162.4	63.1	130.8	753.2	638.3	42.6	72.4	0.	0.0	0.	1414.
1976	66.7	928.2	466.0	448.8	499.4	117.5	114.9	243.3	63.8	33.2	591.8	554.6	34.0	3.2	0.	0.0	0.	1521.
1977	110.0	1052.8	509.3	269.1	753.5	64.9	52.1	181.3	60.2	271.3	1138.6	982.4	48.2	108.0	0.	0.	0.	1652.
1978	79.2	874.8	365.8	291.1	504.5	82.3	110.7	117.8	61.3	150.0	727.1	618.3	38.6	70.2	0.	0.	0.10	1318.
1979	94.4	910.0	447.7	356.8	552.1	64.6	61.4	165.3	57.5	196.5	831.8	693.9	41.9	96.0	0.	0.0	0.	1456.
1980	83.6	859.4	363.0	209.7	611.3	94.0	29.8	136.2	62.8	142.6	837.7	686.2	73.4	78.1	0.	0.	0.10	1286.
1981	80.7	1022.5	491.1	343.4	576.1	191.3	91.3	241.7	62.4	140.0	797.8	660.2	43.4	94.3	0.	0.	0.	1654.
1982	93.6	806.8	399.5	381.7	386.2	74.9	102.0	98.4	56.9	193.8	644.4	570.3	29.1	45.0	0.	0.0	0.10	1300.
1983	109.3	1054.0	511.3	433.8	634.3	75.6	51.4	185.1	59.5	235.0	965.9	807.8	44.3	115.7	0.	0.0	0.	1675.
AVERAGE	75.7	951.3	453.9	345.7	555.6	111.4	81.1	179.3	62.3	145.5	779.0	660.3	45.6	68.4	0.	4.2	0.03	1477.

Target Year 2000

	MUDA DEMAND (A)	MUDA NORTH (B)	DEMAND SOUTH (C)	KEDAH WITHD. (D)	NORTH DEFIC. (E)	JENIANG WITHD. (F)	RELEASE NAOK (G)	REMAN (H)	MUDA RELEA. (I)	SOUTH DEFIC. (J)	TOTAL DEFIC. (K)	R E S E R V O I R			REMAN. DEFICIT (P)	CUT RATE (Q)	TOTAL OUTPUT (R)	
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	PEDU (L)	AHNING (M)	BERIS (N)	T. MUDA (O)	(P)	(Q)	(R)
1961	63.1	1148.1	436.2	364.0	634.2	151.8	102.0	192.0	63.1	140.3	880.6	715.0	51.6	94.0	0.	0.	0.05	1647.
1962	63.3	1015.2	374.1	360.1	519.2	143.2	111.2	160.4	63.3	95.2	662.7	544.3	80.9	57.5	0.	0.	0.20	1453.
1963	85.8	1221.4	493.0	208.6	954.1	158.4	36.9	92.2	67.1	262.9	1374.4	1030.0	63.9	110.1	0.	153.3	0.05	1647.
1964	85.9	960.6	353.1	269.3	561.8	141.0	77.3	170.2	65.9	114.0	750.9	624.8	28.1	98.2	0.	0.	0.30	1400.
1965	79.8	963.2	371.0	380.2	574.9	117.8	31.2	111.1	64.9	134.1	787.7	668.2	28.6	90.9	0.	0.0	0.30	1414.
1966	63.1	959.3	397.3	427.9	407.4	132.8	137.8	225.7	63.1	25.0	480.4	447.9	32.5	0.	0.	0.0	0.05	1420.
1967	63.1	1015.9	416.4	518.2	475.4	95.3	99.1	202.1	63.1	42.2	575.1	545.7	29.4	0.	0.	0.	0.	1495.
1968	178.0	1122.7	467.1	537.4	594.4	71.6	51.8	199.7	59.1	254.1	942.7	790.5	46.7	105.4	0.	0.0	0.	1768.
1969	64.6	1123.5	453.5	437.6	652.8	133.0	46.6	160.4	64.1	147.3	839.0	754.4	46.1	88.5	0.	0.0	0.	1642.
1970	66.8	1066.0	413.9	450.3	499.1	170.1	96.8	217.9	63.9	48.6	608.6	569.4	36.0	3.2	0.	0.	0.	1547.
1971	67.7	1029.3	513.7	646.1	472.1	69.6	109.1	239.3	64.2	78.3	611.5	545.9	34.5	31.1	0.	0.0	0.	1679.
1972	75.0	1180.9	455.1	536.3	616.1	52.3	64.5	195.2	65.2	181.3	886.1	741.4	62.2	102.4	0.	0.0	0.	1711.
1973	65.6	1101.3	389.3	626.3	407.1	108.1	80.7	217.6	64.9	51.4	509.5	469.6	31.1	8.7	0.	0.0	0.	1556.
1974	73.6	1149.9	546.1	554.5	595.3	82.6	67.3	205.4	64.7	199.7	883.3	731.7	46.7	105.0	0.	0.	0.	1769.
1975	63.1	1051.7	425.6	413.2	603.3	122.6	70.5	149.5	63.1	118.3	801.8	683.0	44.0	74.8	0.	0.0	0.	1540.
1976	73.1	1150.5	468.4	551.5	551.4	121.6	116.7	244.8	64.3	41.5	658.8	614.7	34.3	9.7	0.	0.	0.	1692.
1977	187.0	1209.6	508.9	351.4	835.5	62.5	54.5	195.5	61.9	343.9	1310.5	1150.1	48.2	108.1	0.	3.7	0.	1902.
1978	105.6	975.3	323.8	400.1	486.8	78.2	120.0	115.1	62.4	140.1	698.8	569.3	60.9	68.5	0.	0.	0.20	1405.
1979	169.6	1009.9	401.9	461.3	541.0	63.3	58.6	158.9	60.7	237.7	865.2	702.5	67.8	94.2	0.	0.6	0.20	1581.
1980	106.3	949.7	316.5	317.8	595.0	86.7	29.8	136.3	63.5	143.6	820.6	640.3	80.2	83.3	0.	15.1	0.20	1357.
1981	94.0	1230.2	489.0	433.5	614.5	194.3	94.7	255.9	63.4	153.3	855.3	702.1	48.9	104.2	0.	0.	0.05	1813.
1982	153.0	906.8	384.7	484.3	362.9	74.9	108.4	83.6	58.1	252.3	705.8	581.0	52.1	48.6	0.	21.7	0.20	1423.
1983	146.6	1233.1	498.8	539.1	693.7	73.4	55.7	186.3	58.8	170.9	1071.7	913.9	44.4	113.4	0.	0.	0.	1878.
AVERAGE	95.4	1080.2	430.2	446.5	577.0	109.0	79.1	178.9	63.2	152.0	810.0	684.2	46.9	69.6	0.	8.5	0.08	1597.

Table 54

WATER DEMAND AND SUPPLY BALANCE
OF INTEGRATED OPERATION SYSTEM (10/18)Unit: 10⁶ m³Sources Facilities: Pedu-Muda, Ahning, Jeniang, Beris, Reman
Case 3 (Kedah Priority)

Target Year 1990

	MUDA		MAHA		DEMAND SOUTH (C)	KEDAH WITHD. (D)	NORTH DEFIC. (E)	JENIANG WITHD. (F)	RELEASE			RESERVOIR			REMAIN. DEFICIT (P)	CUT RATE (Q)	TOTAL OUTPUT (R)	
	DEMAND (A)	NORTH (B)	NAOK (G)	REMAN (H)					RELEA. (I)	PEDU (L)	AHNING (M)	BERIS (N)	T.MUDA (O)					
1961	63.1	1040.7	461.4	269.5	645.4	151.9	99.0	190.1	63.1	146.3	879.7	729.0	52.0	98.6	0.	0.0	1565.	
1962	63.1	975.2	461.4	266.7	596.3	142.0	106.9	162.1	63.1	162.7	843.2	731.1	45.6	66.6	0.	0.	1500.	
1963	64.0	1108.8	526.6	180.0	903.8	161.7	38.8	102.4	63.9	278.8	1314.0	1090.0	56.0	98.3	0.	62.6	1637.	
1964	63.2	947.6	415.7	189.3	642.0	147.4	63.5	170.7	63.8	150.2	880.2	689.9	87.1	103.2	0.	0.	1427.	
1965	63.5	940.0	448.0	292.9	650.5	117.3	31.2	116.3	63.5	179.7	922.4	718.0	65.1	90.2	0.	26.2	1425.	
1966	63.1	788.1	421.1	304.0	353.5	136.0	148.3	228.9	63.1	16.7	922.4	411.1	379.0	32.1	0.	0.	1356.	
1967	63.1	855.4	438.0	400.1	438.4	100.1	123.9	190.1	63.1	40.7	532.3	502.5	29.8	0.	0.	0.	1518.	
1968	67.0	961.4	489.1	440.1	530.5	81.0	54.0	204.3	59.3	148.2	754.2	618.6	44.7	90.9	0.	0.	1498.	
1969	63.1	969.7	465.6	330.6	604.7	128.9	57.4	157.8	63.1	155.9	845.1	712.4	41.7	91.0	0.	0.	1428.	
1970	63.3	944.0	420.3	340.2	477.0	178.4	85.0	229.4	63.3	54.4	590.5	541.0	36.5	13.0	0.	0.	1520.	
1971	63.1	933.9	522.6	541.8	418.3	76.7	113.5	224.0	63.1	82.2	556.1	500.7	28.0	27.4	0.	0.	1560.	
1972	63.7	1038.5	457.7	443.5	576.7	54.3	71.3	192.5	63.7	157.7	816.0	680.7	41.2	94.1	0.	0.	1444.	
1973	63.1	952.5	428.5	510.5	385.4	113.1	108.4	214.0	63.1	47.6	481.1	438.8	28.6	13.7	0.	0.	1597.	
1974	63.5	989.1	344.1	429.0	556.9	81.9	65.0	206.8	63.5	193.5	833.9	687.1	45.9	100.9	0.	0.	1414.	
1975	63.1	910.3	440.7	305.0	547.1	128.6	77.2	162.4	63.1	130.8	753.2	638.3	42.6	72.4	0.	0.	1518.	
1976	63.7	988.2	466.0	448.3	499.4	117.7	115.0	242.9	63.7	30.4	588.6	554.6	34.0	0.	0.	0.	1608.	
1977	66.1	1032.8	509.5	269.1	753.5	64.9	52.1	181.7	60.2	226.9	1089.4	933.0	48.2	108.1	0.	0.	1303.	
1978	64.1	874.3	363.3	291.1	504.5	82.3	110.7	117.8	61.3	134.9	710.4	600.1	38.6	71.7	0.	0.	1422.	
1979	64.6	910.0	447.7	356.8	552.1	64.6	63.4	165.3	57.5	162.7	794.2	664.3	41.9	88.0	0.	0.	1267.	
1980	64.4	859.4	343.0	209.3	611.3	94.1	29.8	136.2	62.6	123.4	816.3	689.3	45.2	81.9	0.	0.	1638.	
1981	64.0	1082.5	491.1	348.4	578.1	191.8	91.3	241.7	62.6	123.8	779.9	659.1	43.4	77.4	0.	0.	1270.	
1982	64.2	806.8	399.5	381.7	383.2	74.9	108.0	98.4	56.9	164.4	611.7	537.6	29.1	45.0	0.	0.	1631.	
1983	65.3	1054.0	511.3	433.8	634.3	75.6	51.4	185.1	59.5	191.0	917.0	768.2	44.3	104.4	0.	0.	1469.	
AVERAGE	63.9	954.1	455.3	345.7	558.5	111.6	81.1	179.3	62.2	134.9	770.5	654.9	44.4	66.8	0.	3.9	0.03	1469.

Target Year 2000

	MUDA		MAHA		DEMAND SOUTH (C)	KEDAH WITHD. (D)	NORTH DEFIC. (E)	JENIANG WITHD. (F)	RELEASE			RESERVOIR			REMAIN. DEFICIT (P)	CUT RATE (Q)	TOTAL OUTPUT (R)	
	DEMAND (A)	NORTH (B)	NAOK (G)	REMAN (H)					RELEA. (I)	PEDU (L)	AHNING (M)	BERIS (N)	T.MUDA (O)					
1961	63.1	1179.8	449.2	364.0	672.6	151.8	100.8	192.0	63.1	147.8	911.5	759.8	51.8	99.9	0.	0.0	1453.	
1962	63.3	1015.2	374.1	360.1	519.2	143.2	111.2	160.4	63.3	95.2	682.7	565.7	49.9	64.1	0.	0.	1700.	
1963	65.3	1184.2	476.6	208.6	975.0	160.3	37.0	92.2	63.1	247.8	1292.0	1086.0	68.3	108.6	0.	26.2	1481.	
1964	64.6	1029.4	387.0	269.3	640.2	144.7	74.1	168.9	64.6	119.0	843.7	658.1	90.3	95.3	0.	0.	1487.	
1965	64.2	1016.4	399.5	380.2	646.3	118.4	30.7	111.1	64.2	139.2	872.8	698.5	78.9	92.0	0.	3.1	1306.	
1966	63.1	826.3	356.4	426.8	329.3	130.6	132.2	218.7	63.1	5.0	371.5	340.3	31.2	0.	0.	0.	1495.	
1967	63.1	1015.9	416.4	518.2	475.4	95.3	99.1	202.1	63.1	42.2	575.1	545.7	29.4	0.	0.	0.	1658.	
1968	68.3	1122.7	467.1	537.4	586.9	72.0	56.3	208.9	56.6	137.9	805.3	669.7	44.2	91.5	0.	0.	1640.	
1969	63.3	1123.5	453.5	437.6	652.6	133.8	46.6	160.4	63.3	146.1	882.5	745.1	46.1	96.3	0.	0.	1543.	
1970	63.3	1066.0	413.9	450.3	499.1	170.7	97.4	216.7	63.3	45.7	605.4	569.4	36.0	0.	0.	0.	1675.	
1971	63.7	1099.3	511.7	646.1	472.1	70.1	109.1	260.6	63.7	73.1	605.7	543.9	34.5	23.4	0.	0.	1700.	
1972	64.4	1180.9	455.1	536.3	615.3	53.1	64.5	195.2	64.4	171.5	874.2	737.1	42.2	94.9	0.	0.	1554.	
1973	63.7	1101.3	389.3	626.3	406.5	109.3	80.1	217.6	63.7	50.7	508.0	469.6	30.6	7.8	0.	0.	1760.	
1974	63.8	1149.9	546.1	554.5	595.3	83.5	67.3	205.4	63.8	189.9	872.4	721.9	46.7	103.9	0.	0.	1540.	
1975	63.1	1051.7	425.6	413.2	603.3	122.6	70.3	149.3	63.1	118.3	801.8	683.0	44.0	74.8	0.	0.	1683.	
1976	64.1	1150.5	468.4	551.6	551.4	121.8	116.7	244.6	64.0	32.8	649.2	614.7	34.3	0.1	0.	0.	1786.	
1977	68.0	1209.6	508.9	351.6	335.5	63.6	54.5	195.8	60.8	224.6	1178.0	1021.5	48.2	108.3	0.	0.	1364.	
1978	64.8	975.3	323.8	400.1	488.3	79.2	120.0	115.1	61.4	99.9	653.6	546.5	36.8	70.3	0.	0.	1479.	
1979	67.3	1009.9	401.9	461.3	540.9	65.8	58.6	158.9	58.1	135.5	620.5	41.6	89.6	0.	0.	0.	1332.	
1980	65.2	949.7	316.5	317.8	594.8	87.1	29.8	136.3	63.1	102.7	775.0	640.4	48.5	86.1	0.	0.	1833.	
1981	64.7	1263.4	504.9	433.8	652.6	201.0	91.2	251.5	62.7	140.2	880.9	749.4	49.6	81.9	0.	0.	1442.	
1982	66.1	960.8	415.4	489.9	433.6	78.5	108.9	88.6	56.8	186.1	688.5	605.7	35.0	47.8	0.	0.	1798.	
1983	65.7	1233.1	498.8	539.1	693.8	72.4	55.7	180.3	58.8	196.4	989.2	840.2	44.4	104.5	0.	0.	1469.	
AVERAGE	64.6	1086.3	433.0	446.7	583.5	110.0	78.8	178.7	62.4	125.8	785.9	671.2	46.2	67.1	0.	1.3	0.07	1583.

Table 55

WATER DEMAND AND SUPPLY BALANCE
OF INTEGRATED OPERATION SYSTEM (11/18)Unit: 10⁶ m³Sources Facilities: Pedu-Muda, Ahning, Jeniang, Beris, Tawar Muda
Case 1 (Muda Priority)

Target Year 1990

	MUDA DEMAND			KEDAH			NORTH		JENIANG		RELEASE		MUDA			RESERVOIR			REMAIN.		TOTAL
	DEMAND	NORTH	SOUTH	WITHD.	DEFIC.	WITHD.	HAOK	REMAN	RELEA.	SOUTH	TOTAL	PEDU	ANHING	BERIS	T.MUDA	DEFICIT	CUT	DEFICIT	RATE	OUTPUT	
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)	(P)	(Q)	(R)	(S)	(T)	
1961	63.1	1040.7	461.4	269.5	715.5	106.7	61.4	0.	63.1	345.7	1182.9	933.4	61.4	102.4	86.7	0.	0.	0.	0.	1566.	
1962	63.1	723.3	330.8	262.6	416.1	78.6	89.0	0.	63.1	187.8	671.0	430.1	84.6	79.7	76.8	0.	0.40	0.	0.	1117.	
1963	67.4	809.2	423.9	150.0	720.7	123.3	23.6	0.	63.3	299.0	1133.0	882.7	51.7	89.7	60.8	51.4	0.30	0.	0.	1329.	
1964	69.8	745.2	314.1	189.3	480.4	102.7	61.7	0.	63.6	231.1	790.6	573.3	28.7	105.2	83.8	0.	0.40	0.	0.	1129.	
1965	68.0	816.1	387.7	292.9	548.4	82.3	27.6	0.	63.4	257.4	895.3	714.0	31.1	85.8	64.9	0.	0.30	0.	0.	1275.	
1966	63.1	815.8	450.0	304.8	499.2	101.2	67.8	0.	63.1	292.8	880.0	615.1	46.3	130.3	90.4	0.	0.	0.	0.	1331.	
1967	63.1	355.4	438.0	400.1	471.6	70.5	101.1	0.	63.1	250.1	801.8	585.2	35.0	103.8	79.7	0.	0.	0.	0.	1358.	
1968	113.7	961.4	489.1	440.1	563.0	60.3	44.9	0.	55.4	400.2	1070.2	871.9	47.9	91.1	60.5	0.	0.	0.	0.	1365.	
1969	63.1	969.7	485.6	350.6	640.7	92.0	40.8	0.	63.1	339.4	1079.0	874.7	43.0	88.8	73.5	0.	0.	0.	0.	1499.	
1970	63.5	744.0	420.3	340.2	553.5	137.1	54.9	0.	63.5	278.7	924.7	652.1	45.8	132.8	97.2	0.	0.	0.	0.	1431.	
1971	63.1	713.9	522.6	541.8	472.6	54.2	62.2	0.	63.1	325.8	887.1	662.7	39.8	106.2	79.7	0.	0.	0.	0.	1521.	
1972	67.2	1038.5	457.7	443.3	643.7	33.7	30.3	0.	63.7	348.8	1102.6	889.9	46.2	97.5	70.2	0.	0.	0.	0.	1564.	
1973	63.1	752.3	428.5	518.5	439.8	26.0	72.7	0.	63.1	272.0	790.9	588.9	37.4	105.0	80.8	0.	0.	0.	0.	1445.	
1974	66.6	909.1	544.1	429.0	567.4	55.3	56.4	0.	63.6	427.6	1105.6	885.8	46.3	101.4	73.9	0.	0.	0.	0.	1601.	
1975	63.1	910.3	440.7	395.0	591.1	91.6	59.1	0.	63.1	394.3	994.9	801.9	44.1	78.1	71.8	0.	0.	0.	0.	1415.	
1976	66.7	785.2	486.0	446.8	569.2	85.4	77.3	0.	63.2	272.3	939.5	694.3	39.4	113.6	94.6	0.	0.	0.	0.	1523.	
1977	119.0	1032.8	509.5	269.1	749.4	43.5	62.0	0.	57.1	451.2	1356.3	1129.5	52.1	108.5	66.7	0.	0.	0.	0.	1653.	
1978	79.2	750.9	304.8	251.1	449.1	57.8	63.7	0.	58.8	214.4	737.2	506.7	69.8	87.7	73.2	0.	0.30	0.	0.	1135.	
1979	98.4	349.6	418.4	356.8	537.4	45.0	41.0	0.	54.5	331.8	965.8	729.6	44.2	83.9	63.2	40.4	0.20	0.	0.	1326.	
1980	83.6	741.0	239.5	209.3	516.1	68.5	28.4	0.	40.2	231.4	830.5	611.0	77.0	75.9	67.3	0.	0.30	0.	0.	1115.	
1981	80.1	1082.5	497.1	348.4	643.5	151.0	87.5	0.	61.4	361.8	1117.1	816.0	53.9	145.9	103.0	0.	0.	0.	0.	1655.	
1982	91.6	696.3	337.8	367.8	304.6	54.5	51.6	0.	54.6	236.7	668.1	510.3	52.9	60.1	45.6	0.	0.30	0.	0.	1130.	
1983	109.3	1054.0	511.3	433.8	665.7	53.6	45.0	0.	57.4	419.1	1205.4	971.8	47.9	116.1	70.4	0.	0.	0.	0.	1675.	
AVERAGE	75.7	903.6	430.6	345.0	553.2	30.7	57.0	0.	61.2	307.7	962.1	735.2	49.0	99.1	75.4	4.0	0.11	0.	0.	1407.	

Target Year 2000

	MUDA DEMAND			KEDAH			NORTH		JENIANG		RELEASE		MUDA			RESERVOIR			REMAIN.		TOTAL
	DEMAND	NORTH	SOUTH	WITHD.	DEFIC.	WITHD.	HAOK	REMAN	RELEA.	SOUTH	TOTAL	PEDU	ANHING	BERIS	T.MUDA	DEFICIT	CUT	DEFICIT	RATE	OUTPUT	
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)	(P)	(Q)	(R)	(S)	(T)	
1961	63.1	989.3	371.6	364.0	567.1	104.3	64.4	0.	63.7	267.2	920.3	644.7	84.5	101.7	90.3	0.	0.30	0.	0.	1425.	
1962	63.3	826.1	313.4	358.1	476.3	100.5	88.1	0.	63.3	176.5	725.4	517.9	48.9	83.6	75.6	0.	0.40	0.	0.	1263.	
1963	85.8	961.1	378.3	208.6	729.2	122.2	19.4	0.	63.5	292.3	1124.0	908.3	31.1	77.1	59.3	43.3	0.40	0.	0.	1382.	
1964	85.9	891.8	319.2	269.3	546.1	103.3	67.5	0.	63.8	247.0	881.2	664.2	25.5	106.3	86.2	0.	0.40	0.	0.	1298.	
1965	79.8	899.9	342.5	380.2	553.0	84.2	17.9	0.	63.5	225.5	862.8	680.2	28.8	84.6	66.2	2.9	0.40	0.	0.	1319.	
1966	63.1	983.7	410.9	428.3	546.7	96.1	70.7	0.	63.1	252.8	888.3	623.8	46.4	129.1	91.4	0.	0.	0.	0.	1460.	
1967	63.1	1015.9	416.4	518.2	513.3	67.1	91.5	0.	63.1	242.2	839.4	626.1	32.8	104.5	78.4	0.	0.	0.	0.	1497.	
1968	178.0	1122.7	467.1	537.4	625.4	53.5	39.1	0.	54.4	457.9	1203.7	1004.3	48.0	90.9	61.4	0.	0.	0.	0.	1769.	
1969	64.6	1003.4	373.2	437.6	565.2	94.8	36.3	0.	63.6	265.8	921.0	711.6	46.4	90.2	73.9	0.	0.	0.	0.	1462.	
1970	66.8	1066.0	413.9	450.3	571.1	131.1	58.8	0.	63.4	271.9	936.7	670.7	43.4	128.8	96.4	0.	0.	0.	0.	1549.	
1971	67.7	1099.3	511.7	646.1	525.5	46.2	67.1	0.	63.2	330.7	951.4	722.7	42.7	110.5	76.5	0.	0.	0.	0.	1680.	
1972	75.0	1180.9	455.1	536.3	685.6	32.3	29.4	0.	63.9	363.5	1165.7	952.5	48.0	96.6	70.3	0.	0.	0.	0.	1712.	
1973	65.6	1101.3	389.3	626.3	456.5	23.1	68.3	0.	61.3	257.9	793.7	584.7	35.0	97.8	77.8	0.	0.	0.	0.	1558.	
1974	73.6	1149.9	546.1	554.5	606.3	56.8	59.5	0.	63.5	428.9	1150.2	923.3	46.7	108.2	74.0	0.	0.	0.	0.	1771.	
1975	63.1	1051.7	425.6	413.2	640.1	90.1	53.9	0.	63.1	279.9	1022.3	832.3	45.0	77.0	69.9	0.	0.	0.	0.	1542.	
1976	73.1	1150.5	468.4	551.5	619.4	87.4	77.6	0.	63.4	292.4	1013.2	760.6	41.0	115.0	97.2	0.	0.	0.	0.	1692.	
1977	187.0	1209.6	508.9	351.6	853.0	42.5	63.5	0.	54.5	538.3	1545.9	1132.0	54.7	111.6	69.2	160.7	0.	0.	0.	1745.	
1978	105.6	912.8	296.9	399.6	500.6	57.0	67.4	0.	59.3	231.4	813.3	541.4	71.6	83.4	70.8	41.5	0.30	0.	0.	1274.	
1979	169.6	948.3	373.1	461.3	534.9	46.8	63.9	0.	54.6	361.6	994.1	702.2	71.3	85.3	63.2	66.8	0.30	0.	0.	1424.	
1980	106.3	889.9	291.1	317.8	566.4	63.9	28.1	0.	59.8	251.3	908.5	619.1	80.3	76.0	67.5	59.1	0.30	0.	0.	1228.	
1981	94.0	1263.4	504.9	433.8	731.1	157.1	84.4	0.	61.3	394.5	1250.7	924.0	37.7	152.2	113.8	2.8	0.	0.	0.	1860.	
1982	153.0	852.8	354.0	478.6	408.4	58.1	53.9	0.	54.8	306.1	793.9	511.5	58.4	53.4	38.7	118.6	0.30	0.	0.	1241.	
1983	146.6	1233.1	498.8	539.1	733.8	51.8	47.8	0.	56.2	449.6	1314.9	1016.2	47.5	116.5	70.3	57.9	0.	0.	0.	1821.	
AVERAGE	95.4	1037.5	410.9	446.2	589.3	79.6	55.9	0.	61.3	311.5	1001.0	751.1	49.3	99.1	75.6	24.1	0.14	0.	0.	1521.	

Table 56

WATER DEMAND AND SUPPLY BALANCE
OF INTEGRATED OPERATION SYSTEM (12/18)

Unit: 10⁶ m³

Sources Facilities: Pedu-Muda, Ahning, Jeniang, Beris, Tawar Muda
Case 3 (Kedah Priority)

Target Year 1990

	MUDA DEMAND (A)	MUDA NORTH (B)	DEMAND SOUTH (C)	KEDAH WITHD. (D)	NORTH DEFIC. (E)	JENIANG WITHD. (F)	RELEASE NAOK (G)	REMAN (H)	MUDA RELEA. (I)	SOUTH DEFIC. (J)	TOTAL DEFIC. (K)	R E S E R V O I R			REMAIN. DEFICIT (P)	CUT RATE (Q)	TOTAL OUTPUT (R)	
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	PEDU (L)	ANNING (M)	BERIS (N)	T,MUDA (O)	(P)	(Q)	(R)
1961	63.1	1040.7	481.4	289.5	715.9	106.7	61.4	0.	63.1	348.7	1182.9	933.7	61.4	102.0	86.9	0.	0.	1566.
1962	61.1	723.3	330.8	262.6	416.1	98.6	89.0	0.	61.1	187.8	671.0	430.2	84.6	79.7	76.6	0.	0.40	1117.
1963	64.0	962.4	458.1	150.0	795.2	123.3	23.6	0.	63.3	328.0	1248.6	939.0	57.8	80.7	61.0	99.1	0.20	1385.
1964	63.9	312.7	347.9	189.3	547.7	105.1	59.5	0.	63.6	259.2	896.6	665.0	41.7	106.7	83.7	0.	0.30	1225.
1965	63.5	754.1	357.9	292.9	455.5	82.4	27.6	0.	63.4	223.8	783.1	608.1	31.1	84.1	64.9	0.	0.40	1176.
1966	63.1	315.8	450.0	304.3	499.2	101.2	67.8	0.	63.1	292.8	880.0	615.1	46.3	130.5	90.4	0.	0.	1351.
1967	63.1	855.4	438.0	400.1	471.6	70.5	101.1	0.	63.1	250.1	801.8	585.2	35.0	103.8	79.7	0.	0.	1358.
1968	67.0	961.4	489.1	440.1	563.0	60.3	44.9	0.	55.4	353.9	1018.8	820.5	47.9	91.0	60.5	0.	0.	1519.
1969	63.1	969.7	465.6	330.6	640.7	92.3	40.8	0.	63.1	330.6	1079.0	874.7	43.0	88.6	73.5	0.	0.	1499.
1970	63.2	944.0	420.3	340.2	553.5	137.3	54.9	0.	63.3	278.5	924.5	651.9	45.8	132.8	97.2	0.	0.	1450.
1971	63.1	933.9	522.6	541.8	472.6	54.2	62.2	0.	63.1	325.8	887.1	662.7	39.8	106.2	79.7	0.	0.	1521.
1972	63.7	1036.5	457.7	443.3	643.7	33.7	30.3	0.	63.6	345.3	1098.9	886.0	46.2	97.5	70.2	0.	0.	1541.
1973	63.1	952.5	428.5	510.5	439.8	86.0	72.7	0.	63.1	272.0	790.9	568.7	37.4	105.0	80.8	0.	0.	1445.
1974	63.5	989.1	544.1	429.0	567.4	55.9	56.4	0.	63.5	424.6	1102.2	882.4	46.3	101.4	73.9	0.	0.	1598.
1975	63.1	910.3	440.7	305.0	591.1	91.6	59.1	0.	63.1	304.3	994.9	801.9	44.1	78.1	71.8	0.	0.	1415.
1976	63.7	988.2	468.0	448.8	569.2	85.4	77.8	0.	63.2	273.3	936.2	691.0	39.4	113.6	94.6	0.	0.	1520.
1977	66.1	1032.8	509.5	269.1	769.4	43.5	62.0	0.	57.1	407.2	1307.4	1080.7	52.1	108.5	66.7	0.	0.	1609.
1978	64.1	750.9	304.8	291.1	449.1	57.8	63.7	0.	58.8	199.3	720.5	489.9	69.8	87.7	73.2	0.	0.30	1120.
1979	64.6	849.6	418.4	356.8	537.4	45.0	41.0	0.	54.5	298.0	928.2	737.0	44.5	84.0	63.2	0.	0.	1333.
1980	64.4	741.0	289.5	209.3	516.1	68.5	28.6	0.	60.2	212.1	809.2	589.6	77.0	75.9	67.3	0.	0.30	1095.
1981	64.0	1082.5	491.1	348.4	643.5	151.0	87.5	0.	61.4	345.7	1099.1	798.1	53.9	145.9	103.0	0.	0.	1639.
1982	64.2	752.5	368.6	374.7	409.8	57.0	53.8	0.	54.6	235.5	717.0	573.8	32.2	65.3	48.5	0.	0.20	1186.
1983	65.3	1054.0	511.3	433.8	665.7	53.4	45.0	0.	57.4	375.1	1156.5	923.0	47.9	116.1	70.4	0.	0.	1631.
AVERAGE	63.9	909.4	433.6	345.3	563.6	80.9	57.0	0.	61.2	298.8	958.2	750.8	48.9	99.3	75.5	4.3	0.10	1403.

Target Year 2000

	MUDA DEMAND (A)	MUDA NORTH (B)	DEMAND SOUTH (C)	KEDAH WITHD. (D)	NORTH DEFIC. (E)	JENIANG WITHD. (F)	RELEASE NAOK (G)	REMAN (H)	MUDA RELEA. (I)	SOUTH DEFIC. (J)	TOTAL DEFIC. (K)	R E S E R V O I R			REMAIN. DEFICIT (P)	CUT RATE (Q)	TOTAL OUTPUT (R)	
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	PEDU (L)	ANNING (M)	BERIS (N)	T,MUDA (O)	(P)	(Q)	(R)
1961	63.1	989.3	371.6	364.0	567.1	104.3	64.4	0.	63.1	261.2	920.3	674.4	54.8	101.4	90.6	0.	0.30	1425.
1962	63.3	950.7	343.7	359.1	539.9	101.7	86.9	0.	63.3	206.9	829.7	595.2	77.1	83.3	75.3	0.	0.30	1359.
1963	65.3	961.1	378.3	208.6	729.2	122.4	19.4	0.	65.2	261.8	1101.1	895.7	51.1	76.4	59.3	34.8	0.40	1370.
1964	64.6	891.3	319.2	269.3	546.1	103.3	67.5	0.	63.8	225.7	857.5	640.5	25.5	106.3	86.2	0.	0.40	1276.
1965	64.2	899.9	342.5	380.2	553.9	84.2	17.9	0.	63.5	207.9	845.4	666.4	28.6	84.6	68.2	0.	0.40	1307.
1966	63.1	983.7	410.9	428.3	546.7	96.1	70.7	0.	63.1	252.8	888.3	623.8	46.4	129.1	91.4	0.	0.	1460.
1967	63.1	1015.9	416.4	518.2	513.3	67.1	91.5	0.	63.1	242.2	839.4	626.1	32.6	104.5	78.4	0.	0.	1497.
1968	68.3	1122.7	467.1	537.4	625.4	53.5	39.1	0.	54.4	348.2	1081.8	882.5	48.0	90.8	61.4	0.	0.	1639.
1969	63.3	1123.5	453.5	437.6	687.5	46.5	34.9	0.	63.3	320.5	1120.0	911.2	46.9	89.2	73.8	0.	0.	1641.
1970	63.5	1066.0	413.9	450.3	571.1	131.2	58.8	0.	63.5	268.4	932.8	666.8	43.4	126.8	96.4	0.	0.	1546.
1971	63.7	1099.3	511.7	446.1	525.5	46.2	67.1	0.	63.2	326.8	946.9	718.3	42.7	110.3	76.3	0.	0.	1676.
1972	64.4	1180.9	455.1	536.3	685.6	32.3	29.4	0.	63.8	352.6	1153.9	940.6	48.0	96.7	70.3	0.	0.	1702.
1973	63.7	1101.3	389.3	626.3	456.5	83.5	68.3	0.	63.7	256.0	791.6	582.6	35.0	97.8	77.3	0.	0.	1556.
1974	63.8	1149.9	546.1	554.5	606.3	56.8	59.5	0.	63.5	419.1	1139.3	912.4	46.7	108.2	74.0	0.	0.	1761.
1975	63.1	1051.7	425.8	413.2	640.1	90.1	53.9	0.	63.1	279.9	1022.3	832.3	45.0	77.0	69.9	0.	0.	1542.
1976	64.1	1150.5	468.4	531.5	619.4	87.4	77.6	0.	63.4	283.5	1003.5	751.8	41.0	115.0	97.2	0.	0.	1684.
1977	66.8	1209.6	508.9	351.6	853.0	42.5	65.5	0.	56.5	419.5	1415.7	1144.5	54.9	132.5	70.1	28.7	0.	1758.
1978	64.8	850.3	270.0	399.2	436.7	56.9	68.0	0.	58.8	165.6	649.2	446.5	71.7	80.8	70.4	0.	0.40	1185.
1979	67.3	948.3	373.1	461.3	534.9	47.8	30.7	0.	54.6	259.6	882.6	662.1	71.7	86.7	63.1	0.	0.30	1390.
1980	65.2	889.9	291.1	317.8	566.4	63.9	28.1	0.	59.8	210.3	862.9	639.7	80.4	76.0	67.6	0.	0.30	1247.
1981	64.7	1263.4	504.9	433.8	731.1	157.2	84.4	0.	61.2	365.2	1218.2	898.2	57.7	151.6	112.1	0.	0.	1834.
1982	66.1	852.8	354.0	478.6	408.4	58.6	53.9	0.	54.3	219.1	697.3	543.2	58.6	55.8	40.4	0.	0.50	1274.
1983	65.7	1233.1	498.8	539.1	733.8	51.8	47.8	0.	56.2	368.8	1225.1	984.5	47.7	118.4	70.4	0.	0.	1798.
AVERAGE	64.6	1042.8	413.7	446.2	594.6	79.8	53.8	0.	61.1	283.5	975.8	749.7	49.4	99.2	75.6	2.8	0.13	1519.

Table 57

WATER DEMAND AND SUPPLY BALANCE
OF INTEGRATED OPERATION SYSTEM (13/18)

Unit: 10⁶ m³

Sources Facilities: Pedu-Muda, Ahning, Jeniang, Beris, Khlong Thepha,
Case 1 (Muda Priority)

Target Year 1990

	MUDA DEMAND (A)	MUDA NORTH (B)	DEMAND SOUTH (C)	KEDAH WITHD. (D)	NORTH DEFIC. (E)	JENIANG WITHD. (F)	RELEASE MAOX (G)	REMAN (H)	MUDA RELEA. (I)	SOUTH DEFIC. (J)	TOTAL DEFIC. (K)	PEDU (L)	AHNING (M)	BERIS (N)	RESERVOIR T.MUDA (O)	REMAIN. DEFICIT (P)	CUI RATE (Q)	TOTAL OUTPUT (R)
1961	63.1	1040.7	461.4	269.5	721.6	151.9	62.2	0.	63.1	317.0	1151.7	975.2	55.6	100.9	0.	0.0	0.	1565.
1962	63.1	317.7	379.8	264.1	469.2	159.5	59.5	0.	63.1	205.3	771.6	600.9	83.1	27.6	0.	0.	0.25	1261.
1963	67.4	975.2	441.0	150.0	754.8	161.3	76.1	0.	64.6	237.7	1156.0	866.3	90.8	71.2	0.	95.2	0.25	1339.
1964	69.7	846.4	364.9	182.7	562.5	145.8	63.3	0.	64.3	257.7	911.4	763.6	40.2	107.6	0.	0.	0.25	1281.
1965	68.0	847.1	402.7	292.7	568.2	116.7	22.5	0.	64.2	247.6	906.4	727.6	31.1	83.7	0.	57.6	0.25	1260.
1966	63.1	720.5	392.1	305.2	371.2	156.1	79.8	0.	63.1	202.1	659.3	487.3	43.3	128.7	0.	0.	0.20	1176.
1967	63.1	825.4	432.6	400.1	464.2	199.1	102.9	0.	63.1	225.5	786.9	628.5	33.3	105.2	0.	0.0	0.	1356.
1968	113.2	961.4	469.1	440.1	584.0	211.0	44.8	0.	59.3	384.7	1043.0	907.2	47.3	88.6	0.	0.	0.	1564.
1969	63.1	925.7	465.6	330.6	624.8	120.7	47.4	0.	63.1	303.5	1031.4	896.8	43.0	91.6	0.	0.0	0.	1498.
1970	63.5	944.0	420.3	360.2	528.9	178.1	73.2	0.	63.5	248.0	858.3	683.7	43.2	132.7	0.	0.0	0.	1428.
1971	63.1	913.9	522.6	561.5	461.5	76.7	75.2	0.	63.1	301.0	847.2	700.0	38.0	109.1	0.	0.0	0.	1520.
1972	67.2	1032.5	457.7	443.3	639.7	53.5	31.5	0.	64.5	328.9	1076.3	935.0	46.1	95.1	0.	0.	0.	1563.
1973	63.1	957.5	428.5	510.5	427.5	113.1	86.7	0.	63.1	243.1	765.1	612.4	33.0	99.7	0.	0.	0.	1444.
1974	66.7	909.1	544.1	429.0	564.0	81.1	60.5	0.	64.4	400.9	1072.1	919.0	45.9	107.2	0.	0.0	0.	1600.
1975	67.1	910.3	440.7	305.0	585.1	126.6	65.8	0.	63.1	266.6	946.4	826.6	42.8	77.0	0.	0.0	0.	1474.
1976	66.7	928.2	466.0	448.0	561.8	117.5	25.9	0.	63.8	263.0	894.2	743.5	38.2	112.5	0.	0.0	0.	1521.
1977	110.0	1072.8	509.5	269.1	762.9	64.9	58.0	0.	60.2	437.3	1333.5	1024.5	49.5	109.0	0.	155.4	0.	1517.
1978	79.2	312.8	334.3	291.1	473.1	21.3	76.2	0.	61.3	222.9	795.5	668.5	40.3	86.7	0.	0.0	0.20	1226.
1979	98.4	819.4	403.8	356.3	456.5	62.7	59.2	0.	57.5	289.0	872.8	747.0	41.1	84.8	0.	0.0	0.25	1322.
1980	83.6	770.6	302.9	209.3	533.5	91.5	30.3	0.	62.8	227.7	846.1	698.7	71.2	76.1	0.	0.0	0.25	1357.
1981	80.1	1022.5	491.1	348.4	624.6	191.3	92.3	0.	62.4	333.7	1064.8	867.6	49.6	147.8	0.	0.	0.	1654.
1982	93.6	725.4	353.2	371.3	385.4	70.8	53.2	0.	56.9	234.6	689.0	579.1	52.2	57.6	0.	0.0	0.45	1172.
1983	109.3	1054.0	511.3	433.0	659.3	75.6	45.5	0.	59.5	401.0	1178.1	1014.4	45.6	118.1	0.	0.0	0.	1675.
AVERAGE	75.7	914.7	435.7	345.1	557.1	110.5	61.5	0.	62.3	287.3	935.2	777.1	48.0	99.1	0.	12.5	0.09	1414.

Target Year 2000

	MUDA DEMAND (A)	MUDA NORTH (B)	DEMAND SOUTH (C)	KEDAH WITHD. (D)	NORTH DEFIC. (E)	JENIANG WITHD. (F)	RELEASE MAOX (G)	REMAN (H)	MUDA RELEA. (I)	SOUTH DEFIC. (J)	TOTAL DEFIC. (K)	PEDU (L)	AHNING (M)	BERIS (N)	RESERVOIR T.MUDA (O)	REMAIN. DEFICIT (P)	CUI RATE (Q)	TOTAL OUTPUT (R)
1961	63.1	929.3	371.6	364.3	556.2	142.7	74.0	0.	63.1	223.8	866.7	714.4	50.3	102.0	0.	0.	0.30	1424.
1962	63.3	950.7	343.7	359.1	515.2	141.2	92.6	0.	63.3	179.7	772.0	597.5	88.4	86.1	0.	0.	0.30	1358.
1963	85.2	1035.5	411.1	208.6	781.5	157.3	31.4	0.	67.1	286.6	1184.8	979.2	59.8	78.5	0.	62.3	0.30	1470.
1964	35.9	891.8	319.2	269.3	526.1	136.7	73.2	0.	65.9	223.7	813.1	701.9	28.1	103.4	0.	0.	0.40	1297.
1965	77.9	895.9	342.3	380.2	532.4	117.3	24.7	0.	64.9	202.4	816.4	703.2	28.6	84.7	0.	0.0	0.40	1322.
1966	63.1	983.7	410.9	428.3	525.9	133.6	86.6	0.	63.1	218.2	826.8	654.4	44.8	127.6	0.	0.	0.	1458.
1967	63.1	1015.9	416.4	512.2	509.1	95.3	89.0	0.	63.1	220.8	810.9	672.3	32.6	106.1	0.	0.	0.	1495.
1968	178.0	1122.7	467.1	537.4	615.4	71.6	40.3	0.	59.1	444.0	1177.1	1039.9	48.0	89.2	0.	0.0	0.	1768.
1969	64.6	943.3	363.0	427.6	487.7	130.3	42.5	0.	64.1	208.4	773.4	642.6	44.5	86.3	0.	0.0	0.30	1371.
1970	66.2	1066.0	413.9	450.3	543.1	170.1	78.0	0.	63.9	236.4	871.6	712.7	40.2	118.7	0.	0.	0.	1547.
1971	67.9	1099.3	511.7	446.1	517.1	89.6	73.4	0.	64.2	308.4	917.2	757.3	42.2	117.7	0.	0.0	0.	1679.
1972	75.0	1160.9	455.1	536.3	679.7	52.3	31.8	0.	65.2	345.6	1139.3	996.6	47.4	95.2	0.	0.0	0.	1711.
1973	65.6	1101.3	389.3	628.3	450.3	106.1	63.9	0.	64.9	242.8	769.9	636.1	34.7	99.1	0.	0.0	0.	1556.
1974	73.6	1149.9	546.1	554.5	602.0	82.6	62.5	0.	64.7	402.4	1116.9	962.1	46.7	108.2	0.	0.	0.	1769.
1975	63.1	1051.7	425.6	413.2	631.7	122.6	63.2	0.	63.1	246.7	976.0	857.4	44.0	74.6	0.	0.3	0.	1540.
1976	73.1	1150.5	468.4	551.5	612.1	121.6	85.8	0.	64.3	256.6	965.3	806.7	40.4	114.1	0.	3.7	0.	1688.
1977	187.0	1209.6	508.9	351.6	347.9	62.5	60.0	0.	61.9	521.6	1521.7	1165.0	52.2	113.2	0.	172.2	0.	1733.
1978	105.6	912.8	296.9	399.6	478.1	77.5	82.0	0.	62.4	215.6	770.3	567.9	65.7	80.1	0.	51.5	0.30	1264.
1979	169.6	948.3	373.1	461.3	519.5	61.9	49.2	0.	60.7	338.0	953.2	733.6	42.5	87.7	0.	80.5	0.30	1411.
1980	106.3	889.9	291.1	317.3	553.9	86.0	30.4	0.	63.5	235.6	877.3	714.5	80.2	77.5	0.	4.6	0.30	1283.
1981	94.0	1263.4	508.9	433.3	704.1	200.3	91.6	0.	63.4	360.0	1192.4	969.8	56.4	157.9	0.	7.5	0.	1855.
1982	153.0	852.3	354.0	476.6	405.9	71.7	54.4	0.	58.1	291.2	774.5	600.2	57.5	48.3	0.	61.2	0.30	1299.
1983	146.6	1233.1	498.8	539.1	724.6	73.4	48.2	0.	58.3	432.2	1287.6	1066.2	45.7	118.5	0.	51.4	0.	1827.
AVERAGE	95.4	1041.0	412.3	446.2	579.4	108.3	62.5	0.	63.2	289.2	965.1	793.5	48.7	98.9	0.	21.5	0.14	1527.

Table 58

WATER DEMAND AND SUPPLY BALANCE
OF INTEGRATED OPERATION SYSTEM (14/18)

Unit: 10⁶ m³

Sources Facilities: Pedu-Muda, Ahning, Jeniang, Beris, Kholong Thepha
Case 3 (Kedah Priority)

Target Year 1990

	MUDA DEMAND		MADA DEMAND		KEDAH DEMAND		NORTH DEFIC.		JENIANG WITHD.		RELEASE		MUDA SOUTH TOTAL			R E S E R V O I R			REMAIN. CUT		TOTAL OUTPUT
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)	(P)	(Q)	(R)			
1961	63.1	1040.7	461.4	269.5	701.6	151.9	62.2	0.	63.1	317.0	1131.7	975.2	55.6	100.9	0.	0.0	0.	1565.			
1962	63.1	786.2	363.4	263.6	456.9	138.3	100.1	0.	63.1	190.2	719.0	551.6	83.1	84.3	0.	0.	0.30	1213.			
1963	64.0	962.4	458.1	150.0	772.3	161.7	36.1	0.	63.9	300.5	1191.9	994.6	56.0	76.5	0.	58.3	0.20	1426.			
1964	63.8	812.7	347.9	189.3	530.4	143.2	64.5	0.	63.8	232.2	848.5	654.0	87.1	107.4	0.	0.	0.30	1224.			
1965	63.5	816.1	387.9	292.9	556.2	117.1	28.6	0.	63.5	229.1	850.3	727.3	39.2	85.8	0.	0.	0.30	1268.			
1966	63.1	815.8	450.0	304.8	483.4	139.9	85.0	0.	63.1	252.9	818.1	644.0	43.9	130.1	0.	0.0	0.	1329.			
1967	63.1	855.4	438.0	400.1	464.6	100.1	102.9	0.	63.1	225.9	766.9	628.5	33.3	105.2	0.	0.0	0.	1356.			
1968	67.0	961.4	489.1	440.1	554.0	81.0	44.6	0.	59.3	338.4	991.6	855.7	47.3	88.6	0.	0.	0.	1518.			
1969	63.1	969.7	465.6	330.6	824.8	128.9	47.4	0.	63.1	303.5	1031.4	896.8	43.0	91.6	0.	0.0	0.	1498.			
1970	63.2	944.0	420.3	340.2	528.9	178.4	73.2	0.	63.3	245.8	858.6	683.3	43.2	132.1	0.	0.0	0.	1428.			
1971	63.1	923.9	522.6	541.8	461.5	76.7	75.6	0.	63.1	301.0	847.2	700.0	38.0	109.1	0.	0.0	0.	1520.			
1972	63.7	1026.5	457.7	445.3	639.7	54.3	33.5	0.	63.7	325.4	1072.4	931.1	46.1	95.1	0.	0.0	0.	1560.			
1973	63.1	952.5	428.5	510.9	427.5	113.1	86.7	0.	63.1	245.1	745.1	612.4	33.0	99.7	0.	0.	0.	1444.			
1974	63.5	989.1	544.1	429.0	584.0	81.9	60.5	0.	63.5	397.8	1068.7	915.6	43.9	107.2	0.	0.0	0.	1597.			
1975	63.1	910.3	446.7	305.0	585.1	128.6	63.8	0.	63.1	266.6	946.4	826.6	42.8	77.0	0.	0.0	0.	1414.			
1976	63.7	988.2	466.0	448.8	561.8	117.7	85.9	0.	63.7	240.0	890.8	740.1	38.2	112.5	0.	0.0	0.	1518.			
1977	66.1	1032.8	509.5	269.1	762.9	54.9	58.0	0.	60.2	393.3	1284.7	1125.7	49.5	109.4	0.	0.0	0.	1608.			
1978	64.1	750.9	304.8	291.1	429.8	80.3	77.7	0.	61.3	179.6	677.1	524.7	66.2	86.2	0.	0.0	0.30	1120.			
1979	64.8	849.6	418.4	356.8	524.5	63.3	58.5	0.	57.5	272.1	885.1	759.2	41.1	84.8	0.	0.0	0.20	1333.			
1980	64.4	741.0	289.5	209.3	503.1	93.0	30.7	0.	62.6	196.1	777.0	657.4	43.3	76.2	0.	0.	0.30	1095.			
1981	64.0	1082.5	491.1	348.4	624.6	191.8	92.8	0.	62.4	317.6	1046.9	849.7	49.4	147.8	0.	0.	0.	1638.			
1982	64.2	752.5	368.6	374.7	408.2	72.4	54.3	0.	56.9	218.9	696.7	603.1	31.5	62.2	0.	0.	0.20	1185.			
1983	65.3	1054.0	511.3	433.8	659.3	75.6	45.5	0.	59.5	357.0	1129.2	966.2	45.6	117.4	0.	0.0	0.	1631.			
AVERAGE	63.9	914.8	436.3	345.3	556.7	111.1	63.9	0.	62.2	275.8	925.0	774.9	47.9	99.4	0.	2.5	0.09	1412.			

Target Year 2000

	MUDA DEMAND		MADA DEMAND		KEDAH DEMAND		NORTH DEFIC.		JENIANG WITHD.		RELEASE		MUDA SOUTH TOTAL			R E S E R V O I R			REMAIN. CUT		TOTAL OUTPUT
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)	(P)	(Q)	(R)			
1961	63.1	1179.8	449.2	364.0	741.2	151.8	65.1	0.	63.1	306.8	1164.5	1002.5	59.4	102.7	0.	0.0	0.	1692.			
1962	63.3	896.1	313.4	358.1	447.8	140.5	99.9	0.	63.3	153.1	667.7	495.7	86.5	85.5	0.	0.0	0.40	1263.			
1963	65.3	1035.5	411.1	208.6	781.5	159.2	31.4	0.	65.1	266.0	1163.9	953.3	68.3	79.2	0.	56.3	0.30	1455.			
1964	64.6	891.8	319.2	269.3	526.1	140.0	73.2	0.	64.6	202.4	809.4	641.7	64.3	103.4	0.	0.0	0.40	1276.			
1965	64.2	899.9	342.3	380.2	532.4	118.4	24.7	0.	64.2	186.8	799.1	685.8	28.6	84.7	0.	0.0	0.40	1307.			
1966	63.1	983.7	410.9	428.3	525.9	133.6	88.6	0.	63.1	218.2	826.8	654.4	44.8	127.6	0.	0.	0.	1458.			
1967	63.1	1015.9	416.4	518.2	509.1	95.3	89.0	0.	63.1	220.8	810.9	672.3	32.6	106.1	0.	0.	0.	1495.			
1968	68.3	1122.7	467.1	537.4	615.4	72.0	40.3	0.	58.6	334.3	1055.2	917.9	48.0	89.2	0.	0.0	0.	1658.			
1969	65.2	1123.5	453.5	437.6	672.2	133.3	40.3	0.	63.3	293.1	1072.6	935.3	46.1	91.2	0.	0.0	0.	1640.			
1970	63.3	1066.0	413.9	450.3	548.1	170.7	78.0	0.	63.3	232.9	867.7	711.2	40.2	116.3	0.	0.	0.	1543.			
1971	63.7	1099.3	511.7	646.1	517.1	70.1	73.4	0.	63.7	304.4	912.8	752.9	42.2	117.7	0.	0.0	0.	1675.			
1972	64.4	1180.9	455.1	536.3	679.7	53.1	31.8	0.	64.4	335.0	1127.4	984.8	47.4	95.2	0.	0.0	0.	1700.			
1973	63.7	1101.3	389.3	626.3	450.3	109.3	63.9	0.	63.7	240.7	767.8	634.0	34.7	99.1	0.	0.0	0.	1554.			
1974	63.8	1149.9	546.1	554.5	602.8	83.5	62.5	0.	63.8	392.6	1106.0	951.2	46.7	108.2	0.	0.	0.	1760.			
1975	63.1	1051.7	425.6	413.2	631.7	122.6	63.2	0.	63.1	246.7	976.0	857.4	44.0	74.6	0.	0.0	0.	1540.			
1976	64.1	1150.5	468.4	551.5	612.1	121.8	85.8	0.	64.0	247.7	955.3	800.8	40.4	114.1	0.	0.	0.	1683.			
1977	68.0	1209.6	508.9	351.6	847.9	63.6	60.0	0.	60.8	402.6	1389.4	1065.9	52.2	113.1	0.	162.4	0.	1644.			
1978	64.8	912.8	296.9	399.6	477.6	78.5	82.0	0.	61.4	175.4	725.6	603.7	40.8	81.1	0.	0.0	0.30	1275.			
1979	67.3	1009.9	401.9	461.3	583.2	65.3	47.8	0.	58.1	262.9	940.1	727.5	43.0	86.8	0.	74.5	0.20	1405.			
1980	65.2	889.9	291.1	317.8	553.7	86.4	30.4	0.	63.1	194.8	831.7	704.8	48.5	78.4	0.	0.0	0.30	1246.			
1981	64.7	1263.4	508.9	433.8	704.1	201.0	91.6	0.	62.7	339.7	1159.8	947.1	36.4	156.4	0.	0.	0.	1833.			
1982	66.1	798.8	323.4	473.8	357.2	68.9	51.8	0.	36.8	180.5	597.4	488.7	55.6	53.2	0.	0.	0.40	1188.			
1983	65.7	1233.1	498.8	539.1	724.6	73.4	68.2	0.	58.8	353.4	1197.8	1033.4	45.7	118.7	0.	0.	0.	1798.			
AVERAGE	64.6	1054.6	418.2	445.9	593.1	109.3	61.9	0.	62.4	264.8	953.3	792.3	48.5	99.2	0.	11.9	0.12	1526.			

Table 59 WATER DEMAND AND SUPPLY BALANCE OF INTEGRATED OPERATION SYSTEM (15/18)

Unit: 10⁶ m³

Sources Facilities: Pedu-Muda, Ahning, Jeniang, Beris, Reman, Khlong Thepha Case 1 (Muda Priority)

Target Year 1990

	MUDA DEMAND NORTH (A)	HADA NORTH (B)	DEMAND SOUTH (C)	KEDAH WITHD. (D)	NORTH DEFIC. (E)	JENIANG WITHD. (F)	RELEASE HOOK (G)	REMAN (H)	MUDA RELEA. (I)	SOUTH DEFIC. (J)	TOTAL DEFIC. (K)	PEOU (L)	RESERVOIR AHNING (M)	RESERVOIR BERIS (N)	RESERVOIR T.MUDA (O)	REMAIN. DEFICIT (P)	CUT RATE (Q)	TOTAL OUTPUT (R)
1961	63.1	1040.7	461.4	269.5	645.4	151.7	99.0	190.1	63.1	146.3	879.7	735.3	52.0	96.5	0.	0.0	0.	1565.
1962	63.1	975.2	401.4	266.7	596.3	142.3	102.9	162.1	63.1	162.7	843.2	731.1	45.6	66.6	0.	0.	0.	1500.
1963	67.4	1108.8	526.6	150.0	905.8	161.3	32.8	102.4	64.6	282.2	1317.8	1147.2	56.1	98.3	0.	14.6	0.	1684.
1964	69.8	1015.1	449.6	189.3	711.5	146.7	59.7	169.0	64.3	191.6	1003.5	809.1	87.8	100.1	0.	5.8	0.	1529.
1965	68.0	1001.9	478.0	292.9	715.6	116.7	30.6	116.3	64.2	215.7	1030.3	729.3	80.0	92.7	0.	115.5	0.	1432.
1966	63.1	815.3	450.0	304.8	464.2	119.7	150.7	232.0	63.1	34.2	487.0	449.6	53.4	4.0	0.	0.0	0.	1329.
1967	63.1	855.4	438.0	400.1	433.4	100.1	123.9	190.1	63.1	40.7	532.3	502.5	29.8	0.	0.	0.0	0.	1356.
1968	113.3	961.4	489.1	440.1	533.7	51.3	54.0	199.3	59.3	196.4	811.2	662.9	44.7	103.6	0.	0.	0.	1564.
1969	63.1	969.7	465.6	330.6	604.7	126.7	57.4	157.8	63.1	155.9	845.1	721.0	41.7	82.3	0.	0.0	0.	1498.
1970	63.5	944.0	420.3	340.2	477.2	128.1	25.0	229.4	63.5	54.4	590.7	541.3	36.5	134.0	0.	0.0	0.	1428.
1971	63.1	953.9	522.6	541.8	418.3	76.7	113.5	224.0	63.1	82.2	556.1	500.7	28.0	27.4	0.	0.0	0.	1520.
1972	67.2	1038.5	457.7	443.3	577.5	53.5	71.8	192.5	64.5	160.4	819.9	680.7	41.2	98.0	0.	0.	0.	1563.
1973	63.1	952.5	428.5	510.5	395.4	113.1	108.4	216.0	63.1	47.6	481.1	438.8	28.6	15.7	0.	0.	0.	1444.
1974	66.6	989.1	544.1	429.0	556.9	81.1	65.0	206.8	64.4	196.6	837.3	688.0	45.9	105.3	0.	0.0	0.	1600.
1975	63.1	910.3	440.7	305.0	547.1	126.5	77.2	162.4	63.1	130.8	753.2	638.3	42.6	72.4	0.	0.0	0.	1474.
1976	66.7	988.2	466.0	448.2	499.4	117.5	114.9	243.3	63.8	33.2	591.8	554.6	34.0	5.2	0.	0.0	0.	1521.
1977	110.0	1032.8	509.5	249.1	753.5	64.7	52.1	181.3	60.2	271.3	1138.6	982.4	48.2	102.0	0.	0.	0.	1652.
1978	79.2	936.7	393.3	291.1	568.7	82.7	199.8	117.3	61.3	172.1	829.8	720.9	38.6	70.2	0.	0.0	0.	1409.
1979	98.4	970.4	477.0	356.8	615.1	65.7	62.8	164.6	57.5	225.2	931.4	792.3	42.4	96.7	0.	0.	0.	1546.
1980	83.6	918.5	369.8	209.3	672.2	94.4	29.1	135.7	62.8	168.4	933.9	745.5	74.0	78.9	0.	32.0	0.	1340.
1981	80.1	1092.5	491.1	348.4	573.1	191.2	91.3	241.7	62.4	140.0	797.8	660.2	43.4	95.3	0.	0.	0.	1654.
1982	93.6	861.0	430.3	388.7	437.2	77.6	105.4	105.6	56.9	213.8	723.3	646.3	31.5	45.0	0.	0.4	0.	1385.
1983	109.3	1054.0	511.3	435.8	634.4	75.6	51.4	175.3	59.5	244.6	976.7	822.5	44.3	110.0	0.	0.0	0.	1675.
AVERAGE	75.7	972.0	464.4	346.1	577.0	111.3	81.8	178.9	62.3	155.2	813.5	691.2	45.7	68.5	0.	7.3	0.	1505.

Target Year 2000

	MUDA DEMAND NORTH (A)	HADA NORTH (B)	DEMAND SOUTH (C)	KEDAH WITHD. (D)	NORTH DEFIC. (E)	JENIANG WITHD. (F)	RELEASE HOOK (G)	REMAN (H)	MUDA RELEA. (I)	SOUTH DEFIC. (J)	TOTAL DEFIC. (K)	PEOU (L)	RESERVOIR AHNING (M)	RESERVOIR BERIS (N)	RESERVOIR T.MUDA (O)	REMAIN. DEFICIT (P)	CUT RATE (Q)	TOTAL OUTPUT (R)
1961	63.1	1179.8	449.2	364.0	672.6	151.8	100.8	192.0	63.1	147.8	911.5	769.3	51.8	90.4	0.	0.0	0.	1692.
1962	63.3	1079.7	404.5	361.1	529.0	142.7	119.0	159.9	63.3	120.5	788.3	673.4	50.9	64.1	0.	0.0	0.10	1547.
1963	85.8	1184.2	476.6	298.6	915.0	158.5	37.0	92.2	67.1	268.4	1314.9	1115.8	68.3	106.4	0.	22.0	0.10	1725.
1964	85.9	1063.7	403.9	269.3	675.8	144.5	73.6	168.2	65.9	156.2	924.5	758.4	66.5	99.6	0.	0.	0.15	1554.
1965	79.2	1056.1	413.8	380.2	679.0	117.3	30.5	111.1	64.9	168.2	941.4	750.9	28.6	90.8	0.	64.0	0.15	1482.
1966	63.1	910.6	370.0	427.2	356.4	131.3	134.1	221.3	63.1	10.4	407.5	375.9	31.6	0.	0.	0.	0.15	1344.
1967	63.1	1015.9	416.4	516.2	475.4	95.3	92.1	202.1	63.1	42.2	575.1	545.7	29.4	0.	0.	0.	0.	1495.
1968	178.0	1122.7	467.1	537.4	583.5	71.6	51.6	205.6	59.1	254.0	936.2	784.0	46.7	105.4	0.	0.0	0.	1768.
1969	64.6	1123.5	453.5	437.6	652.8	133.0	46.6	160.4	64.1	147.3	889.0	754.4	46.1	88.5	0.	0.0	0.	1642.
1970	66.8	1060.0	413.9	450.3	499.1	170.1	96.8	217.9	63.9	48.6	608.6	569.4	36.0	3.2	0.	0.	0.	1547.
1971	67.7	1099.3	511.7	646.1	472.1	69.6	109.1	239.3	64.2	78.3	611.5	545.9	34.5	31.1	0.	0.0	0.	1679.
1972	75.0	1180.9	455.1	536.3	616.1	52.3	64.5	195.2	65.2	131.3	886.1	741.4	42.2	102.4	0.	0.0	0.	1711.
1973	65.6	1101.3	339.3	626.3	407.1	108.1	60.7	217.6	64.9	51.4	509.5	469.6	31.1	8.7	0.	0.0	0.	1556.
1974	73.6	1149.9	546.1	554.5	595.3	82.6	67.3	205.4	64.7	199.7	883.3	731.7	46.7	105.0	0.	0.	0.	1769.
1975	63.1	1051.7	425.6	413.2	603.2	122.6	70.5	149.5	63.1	118.3	801.8	683.0	44.0	74.8	0.	0.0	0.	1540.
1976	73.1	1150.5	468.4	551.5	551.4	121.6	116.7	244.8	64.3	41.5	658.8	614.7	34.3	9.7	0.	0.	0.	1692.
1977	187.9	1209.6	508.9	351.6	835.5	62.5	54.5	195.5	61.9	343.9	1310.5	1151.3	48.2	108.1	0.	2.6	0.	1903.
1978	105.6	1006.6	337.2	400.3	520.1	76.5	119.3	114.7	62.4	156.0	749.0	618.5	60.9	68.5	0.	0.9	0.15	1449.
1979	169.6	1040.8	416.3	461.3	573.6	64.0	57.6	158.5	60.7	251.0	916.3	744.7	70.9	96.2	0.	4.0	0.15	1623.
1980	106.3	979.7	329.3	317.8	627.1	87.0	29.4	136.0	63.5	154.4	868.3	697.6	80.2	81.5	0.	8.2	0.15	1607.
1981	94.0	1196.9	473.1	433.1	579.7	192.3	95.7	258.9	63.4	140.4	800.2	651.2	48.1	100.8	0.	0.	0.10	1764.
1982	153.0	960.8	415.4	489.9	433.6	77.2	102.9	87.9	58.1	273.8	785.9	662.5	35.0	55.8	0.	31.2	0.10	1498.
1983	146.6	1233.1	498.8	539.1	693.8	73.4	55.7	180.3	58.8	277.3	1079.0	921.2	44.4	113.4	0.	0.	0.	1878.
AVERAGE	95.4	1094.1	436.7	446.7	591.8	109.1	78.7	178.9	63.2	157.8	832.9	710.0	46.8	69.7	0.	5.8	0.06	1620.

Table 60 WATER DEMAND AND SUPPLY BALANCE OF INTEGRATED OPERATION SYSTEM (16/18)

Unit: 10⁶ m³

Sources Facilities: Pedu-Muda, Ahning, Jeniang, Beris, Reman, Khlong Thepha Case 3 (Kedah Priority)

Target Year 1990

	MUDA DEMAND		MADA DEMAND		KEDAH WITHD.		NORTH DEFIC.		JENIANG WITHD.		RELEASE		MUDA SOUTH		TOTAL DEFIC.		RESERVOIR			REMAIN. DEFICIT	CUT RATE	TOTAL OUTPUT
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)	(P)	(Q)	(R)				
1961	63.1	1040.7	461.4	269.5	645.4	151.7	99.0	190.1	63.1	146.3	879.7	723.8	52.0	103.8	0.	0.0	0.	1565.				
1962	61.1	975.2	461.4	266.7	596.3	142.0	106.9	162.1	63.1	162.7	843.2	731.1	45.6	66.6	0.	0.	0.	1500.				
1963	64.0	1108.8	526.6	150.0	903.8	161.7	38.8	102.4	63.9	278.8	1316.0	1159.2	56.5	98.3	0.	0.	0.	1699.				
1964	63.8	1015.1	449.6	189.3	711.5	149.3	59.9	169.0	63.8	185.7	996.8	842.1	55.5	99.3	0.	0.0	0.	1528.				
1965	63.5	1001.9	478.9	292.9	713.6	117.3	30.6	116.3	63.5	209.2	1025.3	761.9	85.7	92.6	0.	76.6	0.	1467.				
1966	63.1	815.8	450.0	304.3	404.2	139.9	150.9	232.0	63.1	34.2	487.0	449.6	33.4	4.0	0.	0.0	0.	1329.				
1967	63.1	855.4	438.0	400.1	438.4	100.1	123.9	190.1	63.1	40.7	532.3	502.5	29.8	0.	0.	0.0	0.	1356.				
1968	67.0	961.4	489.1	440.1	533.7	81.0	54.0	199.3	59.3	150.1	759.7	620.0	44.7	95.0	0.	0.	0.	1518.				
1969	63.1	969.7	465.6	330.6	604.7	128.9	57.4	157.8	63.1	155.9	845.1	712.4	41.7	91.0	0.	0.0	0.	1498.				
1970	63.3	944.0	420.3	340.2	477.0	178.4	85.0	229.4	63.3	54.4	590.5	541.0	36.5	13.0	0.	0.0	0.	1428.				
1971	63.1	933.9	522.6	541.8	418.3	76.7	113.5	224.0	63.1	82.2	556.1	500.7	28.0	27.4	0.	0.0	0.	1520.				
1972	63.7	1036.5	457.7	443.3	576.7	54.3	71.8	192.5	63.7	197.7	816.0	680.7	41.2	94.1	0.	0.	0.	1560.				
1973	63.1	932.5	428.5	510.5	383.4	113.1	108.4	216.0	63.1	47.6	481.1	436.8	28.6	13.7	0.	0.	0.	1444.				
1974	63.5	989.1	544.1	429.0	556.9	81.9	65.0	206.8	63.5	193.5	833.9	687.1	45.9	100.9	0.	0.0	0.	1597.				
1975	63.1	910.3	440.7	305.0	448.8	499.4	128.6	77.2	162.4	63.1	130.8	753.2	42.6	72.4	0.	0.0	0.	1414.				
1976	63.7	988.2	466.0	448.8	499.4	117.7	115.0	242.9	63.7	30.4	588.6	554.6	34.0	0.	0.	0.0	0.	1518.				
1977	66.1	1032.8	509.5	269.1	753.5	64.9	52.1	181.7	60.2	226.9	1089.4	933.0	48.2	108.1	0.	0.	0.	1608.				
1978	64.3	936.7	393.3	291.1	568.7	82.9	109.8	117.3	61.3	163.0	813.1	702.7	38.6	71.7	0.	0.0	0.	1394.				
1979	64.6	970.4	477.0	356.8	613.1	65.9	62.5	164.6	57.5	191.4	893.8	762.7	42.4	88.7	0.	0.0	0.	1512.				
1980	64.4	916.5	369.8	209.3	672.2	94.6	29.1	135.7	62.6	149.1	912.5	783.2	45.4	78.8	0.	4.6	0.	1348.				
1981	64.0	1082.5	491.1	348.4	578.1	191.8	91.3	241.7	62.4	123.8	779.9	659.1	43.4	77.4	0.	0.	0.	1638.				
1982	64.2	861.0	430.3	388.7	437.2	77.4	105.4	105.6	56.9	184.3	690.6	614.1	31.5	45.0	0.	0.	0.	1356.				
1983	65.3	1054.0	511.3	433.8	634.4	75.6	51.4	175.3	59.5	200.7	927.9	782.5	44.3	101.0	0.	0.	0.	1631.				
AVERAGE	63.9	972.0	464.4	346.1	576.9	112.0	80.3	178.9	62.2	143.4	800.4	686.1	43.3	67.1	0.	3.5	0.	1497.				

Target Year 2000

	MUDA DEMAND		MADA DEMAND		KEDAH WITHD.		NORTH DEFIC.		JENIANG WITHD.		RELEASE		MUDA SOUTH		TOTAL DEFIC.		RESERVOIR			REMAIN. DEFICIT	CUT RATE	TOTAL OUTPUT
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)	(P)	(Q)	(R)				
1961	63.1	1179.8	449.2	364.0	672.6	151.8	100.8	192.0	63.1	147.8	911.5	759.8	51.8	99.9	0.	0.0	0.	1692.				
1962	63.3	1112.0	419.6	361.7	623.4	143.7	109.6	159.9	63.3	133.4	840.9	725.2	51.2	64.5	0.	0.0	0.05	1595.				
1963	65.3	1258.6	509.3	208.6	992.6	160.5	36.8	92.2	65.1	277.6	1411.0	1163.1	68.3	104.9	0.	67.3	0.	1766.				
1964	64.6	1098.1	420.8	269.3	711.4	147.0	73.1	167.5	66.6	150.6	937.8	760.2	91.5	99.4	0.	6.0	0.10	1577.				
1965	64.2	1059.7	428.1	380.2	711.3	118.4	30.3	111.1	64.2	166.5	975.3	730.8	73.0	91.2	0.	72.3	0.10	1510.				
1966	63.1	935.0	383.7	427.5	381.9	132.1	135.9	223.6	63.1	17.5	443.8	411.9	32.0	0.	0.	0.	0.10	1382.				
1967	63.1	1015.9	416.4	518.2	475.4	95.3	99.1	202.1	63.1	42.2	575.1	545.7	29.4	0.	0.	0.	0.	1495.				
1968	68.3	1122.7	467.1	337.4	591.6	72.0	51.6	202.5	58.6	144.3	817.6	678.3	46.7	92.6	0.	0.0	0.	1658.				
1969	63.3	1123.5	453.5	437.6	652.6	133.8	46.6	160.4	63.3	146.1	887.5	745.1	46.1	96.3	0.	0.0	0.	1640.				
1970	63.3	1066.0	413.9	450.3	499.1	170.7	97.4	216.7	63.3	45.7	605.4	569.4	36.0	0.	0.	0.0	0.	1543.				
1971	63.7	1099.3	511.7	646.1	472.1	70.1	109.1	240.6	63.7	73.1	605.7	545.9	34.5	25.4	0.	0.0	0.	1675.				
1972	64.4	1180.9	455.1	536.3	615.3	53.1	64.5	195.2	64.4	171.5	874.2	737.1	42.2	94.9	0.	0.0	0.	1700.				
1973	63.7	1101.3	389.3	626.3	406.5	109.3	80.1	217.4	63.7	50.7	508.0	469.6	30.6	7.8	0.	0.0	0.	1554.				
1974	63.8	1149.9	546.1	554.5	595.3	83.5	67.3	205.4	63.8	189.9	872.4	721.9	46.7	103.9	0.	0.	0.	1760.				
1975	63.1	1051.7	425.4	413.2	603.3	122.6	70.5	149.5	63.1	118.3	801.8	683.0	44.0	74.8	0.	0.0	0.	1540.				
1976	64.1	1150.5	468.4	551.5	551.4	121.8	116.7	244.6	64.0	32.8	649.2	614.7	34.3	0.1	0.	0.	0.	1683.				
1977	68.0	1209.6	508.9	351.6	835.5	63.6	54.5	195.8	60.8	224.6	1178.0	1021.5	48.2	108.3	0.	0.0	0.	1786.				
1978	64.8	1037.8	350.7	400.5	551.4	79.9	118.7	114.4	61.4	127.1	753.9	650.5	36.8	66.6	0.	0.0	0.10	1453.				
1979	67.3	1071.6	430.7	461.3	606.6	67.2	56.5	158.1	58.1	161.8	853.8	715.4	43.5	94.9	0.	0.	0.10	1570.				
1980	65.2	1009.6	342.0	317.8	659.0	87.7	29.2	135.7	63.1	124.4	870.4	735.3	48.5	86.7	0.	0.	0.10	1417.				
1981	64.7	1263.4	504.9	433.8	652.6	201.0	91.2	231.5	62.7	190.2	880.9	749.4	49.6	81.9	0.	0.	0.	1833.				
1982	66.1	987.8	430.8	492.8	460.4	79.3	106.5	91.9	36.8	197.0	730.3	643.0	36.9	47.8	0.	2.4	0.05	1482.				
1983	65.7	1233.1	498.8	539.1	693.8	73.4	55.7	176.0	58.8	200.6	993.8	844.9	44.4	104.5	0.	0.	0.	1798.				
AVERAGE	64.6	1110.8	444.5	446.9	609.3	110.3	78.3	178.5	62.4	134.1	826.0	705.3	46.4	67.2	0.	6.4	0.03	1613.				

Table 61 WATER DEMAND AND SUPPLY BALANCE OF INTEGRATED OPERATION SYSTEM (17/18)

Unit: 10⁶ m³

Sources Facilities: Pedu-Muda, Ahning, Jeniang, Beris, Reman, Tawar Muda, Khlong Thepha

Case 1 (Muda Priority)

Target Year 1990

	MUDA DEMAND (A)	MUDA NORTH (B)	DEMAND SOUTH (C)	KEDAH WITHD. (D)	NORTH DEFIC. (E)	JENIANG WITHD. (F)	RELEASE HAOK (G)	REMAN (H)	MUDA RELEA. (I)	SOUTH DEFIC. (J)	TOTAL DEFIC. (K)	R E S E R V O I R			REMAIN. DEFICIT (P)	CUI RATE (Q)	TOTAL OUTPUT (R)	
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	PEDU (L)	AHNING (M)	BERIS (N)	T. MUDA (O)	(P)	(Q)	(R)
1961	63.7	1040.7	401.4	227.5	561.5	106.27	105.1	170.0	63.1	191.0	947.7	726.5	52.4	105.2	69.0	0.	0.	1568.
1962	63.1	775.2	461.4	266.7	616.5	101.1	101.5	143.7	63.1	205.5	915.5	741.9	46.1	65.9	63.9	0.	0.	1502.
1963	67.4	1105.8	526.6	150.0	723.5	125.2	35.0	72.7	63.2	334.5	1397.8	1161.5	58.0	98.7	74.1	4.9	0.	1698.
1964	69.2	1015.1	449.6	189.3	730.5	170.1	55.2	145.6	63.6	240.0	1078.4	838.5	57.3	98.1	81.9	2.3	0.	1532.
1965	62.0	1001.9	478.0	292.9	716.7	82.3	32.1	99.9	63.4	260.6	1085.8	723.8	26.2	91.8	64.0	108.0	0.	1440.
1966	61.1	835.8	450.0	304.8	432.1	101.2	119.2	297.6	63.1	101.0	592.2	461.5	58.4	47.2	46.6	0.	0.	1330.
1967	63.1	855.4	438.0	400.1	422.4	70.5	131.0	212.7	63.1	40.7	532.3	499.4	29.8	0.	5.2	0.	0.	1538.
1968	115.3	961.4	439.1	400.1	551.7	60.5	52.6	140.3	63.1	101.0	592.2	688.6	47.9	101.5	70.9	0.	0.	1567.
1969	65.1	969.7	425.6	336.6	520.1	92.8	46.7	126.9	63.1	218.2	931.4	726.6	43.0	91.4	72.1	0.	0.	1500.
1970	63.5	744.0	420.5	300.2	520.1	157.9	67.7	204.8	63.5	90.6	689.7	535.4	44.5	55.4	58.9	0.	0.	1430.
1971	63.1	933.2	522.6	511.6	433.4	54.2	104.1	200.0	63.1	125.1	618.3	699.9	32.2	48.6	59.3	0.	0.	1521.
1972	67.2	1048.5	457.7	445.5	602.7	52.7	61.1	168.6	63.7	196.4	881.2	677.6	41.2	101.0	65.8	0.	0.	1507.
1973	63.1	952.5	428.5	510.5	408.3	86.5	65.5	199.9	63.1	90.9	554.6	458.1	32.5	35.6	30.0	0.	0.	1446.
1974	66.4	949.1	544.1	629.0	561.2	55.2	63.4	171.1	63.6	255.7	907.6	688.8	46.5	105.8	71.6	0.	0.	1602.
1975	63.1	910.3	440.7	395.8	567.5	91.6	70.6	146.7	63.1	169.8	819.2	638.6	42.8	79.1	61.3	0.	0.	1418.
1976	66.7	982.2	466.0	442.2	535.4	25.4	61.5	219.1	63.2	87.6	692.3	571.5	39.4	45.4	39.5	0.	0.	1524.
1977	119.0	1932.8	509.5	269.1	757.1	43.5	51.8	173.3	62.1	299.9	1174.4	965.4	48.2	107.9	59.3	0.	0.	1656.
1978	79.2	936.7	395.3	291.1	529.5	59.9	100.5	105.1	58.8	214.5	882.2	702.1	38.6	76.1	68.9	0.	0.	1412.
1979	98.4	970.4	477.0	356.8	621.9	47.6	50.1	151.2	54.5	283.8	1006.3	800.5	43.4	90.6	70.1	1.7	0.	1544.
1980	85.6	918.5	369.8	209.3	685.0	69.2	27.3	120.9	60.2	199.4	982.6	747.7	78.9	77.6	66.7	10.6	0.	1361.
1981	80.1	1052.5	491.1	342.4	608.7	151.0	26.6	229.7	61.4	167.9	862.9	630.5	47.3	101.6	88.8	0.	0.	1628.
1982	93.6	861.0	430.5	562.7	649.3	60.5	87.1	75.8	54.6	268.9	792.0	664.9	33.0	68.1	36.5	0.	0.	1387.
1983	109.3	1054.0	511.3	433.3	638.5	53.6	52.1	164.6	57.4	274.6	1014.5	799.0	47.9	105.2	68.1	0.	0.	1680.
AVERAGE	75.7	972.0	464.4	346.1	594.4	81.7	72.1	157.9	61.2	198.8	881.3	695.3	46.8	77.8	59.7	5.5	0.	1509.

Target Year 2000

	MUDA DEMAND (A)	MUDA NORTH (B)	DEMAND SOUTH (C)	KEDAH WITHD. (D)	NORTH DEFIC. (E)	JENIANG WITHD. (F)	RELEASE HAOK (G)	REMAN (H)	MUDA RELEA. (I)	SOUTH DEFIC. (J)	TOTAL DEFIC. (K)	R E S E R V O I R			REMAIN. DEFICIT (P)	CUI RATE (Q)	TOTAL OUTPUT (R)	
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	PEDU (L)	AHNING (M)	BERIS (N)	T. MUDA (O)	(P)	(Q)	(R)
1961	63.1	1148.1	436.2	364.0	652.5	107.3	104.0	171.3	63.1	185.5	930.9	715.2	51.8	98.1	69.7	0.	0.05	1649.
1962	63.3	1112.0	419.8	361.7	650.1	101.7	100.0	140.7	63.5	177.5	919.5	736.8	52.2	65.8	68.1	0.	0.05	1598.
1963	85.8	1221.4	493.0	208.6	968.4	122.7	35.7	63.5	63.5	339.8	1453.6	1105.5	68.3	98.8	75.4	96.8	0.05	1703.
1964	85.9	1098.1	420.8	289.3	725.4	109.4	59.9	144.9	63.8	228.2	1064.0	804.4	53.2	92.6	83.9	22.4	0.10	1582.
1965	79.8	1089.7	428.1	380.2	716.7	84.2	30.1	94.4	63.5	228.6	1050.3	686.6	28.6	92.3	65.2	159.9	0.10	1438.
1966	63.1	959.3	397.3	427.9	644.5	95.9	112.5	209.4	63.7	66.8	567.9	561.6	39.2	55.1	36.2	0.	0.05	1422.
1967	63.1	1015.9	416.4	518.2	475.4	67.1	105.0	226.3	63.1	42.2	575.1	542.7	29.4	0.	5.5	0.	0.	1498.
1968	178.0	1122.7	467.1	537.4	611.4	53.5	47.1	120.3	54.4	337.7	1054.5	830.5	48.0	108.3	70.9	0.	0.	1770.
1969	64.6	1093.5	438.4	637.6	637.9	95.9	39.8	130.2	63.6	191.6	921.7	716.9	46.1	90.7	72.5	0.	0.05	1601.
1970	66.8	1066.0	415.9	450.3	551.1	131.1	66.7	207.7	63.4	76.4	697.2	567.6	40.9	48.2	44.9	0.	0.	1551.
1971	67.7	1099.3	511.7	646.1	488.6	46.2	100.2	201.7	63.2	132.8	690.4	559.7	57.6	48.8	46.3	0.	0.	1680.
1972	75.0	1180.9	455.1	536.3	657.2	32.3	45.6	171.8	63.9	205.9	956.8	739.0	44.5	108.9	68.0	0.	0.	1715.
1973	65.6	1101.3	389.3	626.3	422.0	83.1	78.5	197.3	64.1	85.0	565.4	476.5	33.7	26.5	28.5	0.	0.	1558.
1974	73.6	1149.9	546.1	554.5	599.5	56.8	66.6	172.4	63.5	256.1	950.7	731.8	46.7	104.8	71.8	0.	0.	1773.
1975	63.1	1051.7	425.0	413.2	618.3	90.1	64.9	130.4	63.1	160.4	865.2	684.7	44.0	77.4	60.7	0.	0.	1542.
1976	73.1	1150.5	468.4	551.5	591.5	87.4	79.2	251.3	63.4	87.4	754.4	629.3	61.0	45.8	42.9	0.	0.	1696.
1977	187.0	1209.6	508.9	351.6	838.0	42.5	55.7	178.6	56.5	382.6	1356.2	1143.5	48.2	108.1	59.4	0.	0.	1908.
1978	105.6	1037.8	350.7	400.5	560.8	58.4	111.5	102.8	59.5	200.8	846.2	615.6	61.2	70.9	66.4	28.9	0.10	1465.
1979	169.6	1071.6	430.7	461.3	619.9	48.1	46.2	122.6	55.6	318.1	1042.2	747.7	73.3	91.2	72.1	52.1	0.10	1620.
1980	106.3	1009.6	342.0	317.8	671.2	64.8	27.1	119.6	59.8	197.4	965.2	721.6	80.6	78.7	87.0	15.5	0.10	1442.
1981	94.0	1230.2	489.0	433.5	652.6	154.9	88.0	239.8	61.3	183.0	928.5	670.5	50.2	117.7	96.0	0.	0.05	1818.
1982	153.0	987.8	430.8	492.3	478.2	62.1	91.5	64.5	54.8	328.0	895.8	705.1	39.2	84.3	32.8	48.9	0.05	1523.
1983	146.6	1233.1	498.8	539.1	704.5	51.8	54.7	165.2	56.2	308.7	1123.7	900.2	47.7	111.1	68.9	0.	0.	1882.
AVERAGE	95.4	1104.1	442.5	446.9	623.3	80.3	69.9	157.0	61.3	205.2	920.6	716.9	48.1	77.7	59.7	18.5	0.04	1628.

Table 62

WATER DEMAND AND SUPPLY BALANCE
OF INTEGRATED OPERATION SYSTEM (18/18)

Unit: 10⁶ m³

Sources Facilities: Pedu-Muda, Ahning, Jeniang, Beris, Reman, Tawar Muda, Khlung Thepha
Case 3 (Kedah Priority)

Target Year 1990

	MUDA DEMAND (A)	MUDA NORTH (B)	DEMAND SOUTH (C)	KEDAH WITHD. (D)	NORTH DEFIC. (E)	JENIANG WITHD. (F)	RELEASE MAOK (G)	REMAN (H)	MUDA RELEA. (I)	SOUTH DEFIC. (J)	TOTAL DEFIC. (K)	PEDU (L)	AHNING (M)	BERIS (N)	T.MUDA (O)	REMAIN. DEFICIT (P)	CUI RATE (Q)	TOTAL OUTPUT (R)
1961	63.1	1060.7	461.4	269.5	601.9	106.7	103.1	170.0	63.1	191.0	947.7	722.1	52.4	107.6	69.0	0.	0.	1568.
1962	63.1	975.2	461.4	266.7	618.5	101.1	101.3	143.7	63.1	205.5	915.5	742.5	46.1	64.9	63.9	0.	0.	1501.
1963	64.0	1108.8	526.6	150.0	923.5	123.3	35.0	72.7	63.3	331.1	1394.0	1163.4	58.0	100.1	74.1	0.	0.	1701.
1964	65.8	1015.1	449.6	189.3	730.5	110.1	53.2	145.6	63.6	234.1	1071.7	835.5	57.3	99.2	81.8	0.	0.	1530.
1965	63.5	1001.9	478.0	292.9	716.7	82.4	32.1	99.9	63.4	256.1	1080.9	757.3	86.2	90.7	64.0	74.4	0.	1469.
1966	63.1	815.3	450.0	304.3	432.1	101.2	119.2	207.6	63.1	101.0	592.2	461.3	38.4	47.2	46.6	0.	0.	1330.
1967	63.1	855.4	438.0	400.1	438.4	70.5	131.0	212.7	63.1	40.7	532.3	499.4	29.8	0.	5.2	0.	0.	1519.
1968	67.0	961.4	489.1	440.1	551.7	60.3	52.6	140.8	55.4	216.6	853.7	635.8	47.9	100.7	71.1	0.	0.	1500.
1969	63.1	969.7	465.6	330.6	620.1	92.3	46.7	126.9	63.1	218.2	931.4	726.6	43.0	91.4	72.1	0.	0.	1430.
1970	63.3	944.0	420.3	340.2	529.8	137.3	61.7	204.3	63.3	90.6	689.4	535.4	34.2	48.6	39.3	0.	0.	1521.
1971	63.1	933.9	522.6	541.8	435.4	54.2	104.1	200.0	63.1	123.1	618.3	499.9	34.2	48.6	39.3	0.	0.	1563.
1972	63.7	1038.5	457.7	443.3	602.7	33.7	61.2	168.6	63.6	186.9	877.3	674.5	41.2	98.7	62.7	0.	0.	1446.
1973	63.1	952.5	428.5	510.5	408.3	86.0	85.5	199.9	63.1	90.9	554.6	458.1	32.5	35.6	30.0	0.	0.	1598.
1974	63.5	989.1	544.1	429.0	561.2	55.9	63.4	171.1	63.5	232.6	904.2	681.8	46.3	106.2	71.5	0.	0.	1416.
1975	63.1	910.3	440.7	305.0	567.5	91.6	70.6	146.7	63.1	169.8	819.2	643.0	42.8	74.8	61.3	0.	0.	1520.
1976	63.7	988.2	466.0	446.8	535.4	65.4	81.3	219.1	63.7	255.9	844.6	689.0	37.3	43.4	36.9	0.	0.	1612.
1977	66.1	1032.8	509.5	269.1	757.1	43.5	100.3	173.8	63.7	199.5	805.5	687.2	38.6	74.3	68.9	0.	0.	1397.
1978	64.1	936.7	393.3	291.1	579.5	99.9	51.3	105.1	58.8	199.5	805.5	687.2	38.6	74.3	68.9	0.	0.	1516.
1979	64.6	970.4	477.0	356.8	621.9	47.6	50.7	131.2	54.5	249.9	968.7	770.3	43.4	89.0	70.1	0.	0.	1355.
1980	64.4	918.5	369.8	209.3	685.0	69.8	27.3	120.9	60.2	180.2	961.3	770.0	48.5	78.7	66.9	0.	0.	1600.
1981	64.0	1082.5	491.1	348.4	608.7	191.0	86.6	229.7	61.4	151.8	845.0	630.3	47.3	90.9	79.6	0.	0.	1338.
1982	64.2	861.0	430.3	388.7	449.3	40.5	87.1	75.8	54.6	239.5	765.3	632.2	33.8	66.1	36.5	0.	0.	1636.
1983	65.3	1054.0	511.3	433.8	638.5	53.6	52.1	104.6	57.4	230.6	965.7	755.6	47.9	100.3	67.8	0.	0.	1499.
AVERAGE	63.9	972.0	464.4	346.1	594.4	81.7	72.1	157.9	61.2	187.0	868.2	685.7	45.4	76.9	59.0	3.2	0.	1499.

Target Year 2000

	MUDA DEMAND (A)	MUDA NORTH (B)	DEMAND SOUTH (C)	KEDAH WITHD. (D)	NORTH DEFIC. (E)	JENIANG WITHD. (F)	RELEASE MAOK (G)	REMAN (H)	MUDA RELEA. (I)	SOUTH DEFIC. (J)	TOTAL DEFIC. (K)	PEDU (L)	AHNING (M)	BERIS (N)	T.MUDA (O)	REMAIN. DEFICIT (P)	CUI RATE (Q)	TOTAL OUTPUT (R)
1961	63.1	1179.8	449.2	366.0	684.4	107.3	102.8	171.3	63.1	199.2	981.8	757.7	52.0	105.4	70.9	0.	0.	1694.
1962	63.3	1144.3	434.8	362.2	683.2	101.7	100.0	140.7	63.3	191.3	971.6	781.8	52.2	72.0	68.1	0.	0.	1656.
1963	65.3	1258.6	509.3	208.6	1006.3	123.0	35.6	63.5	63.2	334.9	1490.2	1164.5	68.3	98.3	79.4	15.3	0.	1738.
1964	64.6	1098.1	420.8	269.3	729.4	109.4	59.9	144.7	63.8	210.9	1040.3	762.3	91.5	98.7	83.7	5.6	0.10	1576.
1965	64.2	1069.7	428.1	380.2	716.7	84.2	30.1	94.4	63.5	213.0	1033.0	726.9	63.8	93.2	63.2	75.3	0.10	1506.
1966	63.1	933.0	383.7	427.5	415.6	95.3	110.8	210.0	63.1	59.6	527.8	425.5	38.7	29.9	35.6	0.	0.10	1385.
1967	63.1	1015.9	416.4	518.2	475.6	67.1	105.0	224.3	63.1	42.6	573.1	544.7	29.4	0.	5.5	0.	0.	1498.
1968	68.3	1122.7	467.1	337.4	611.4	33.5	47.1	126.3	54.4	228.0	932.6	715.8	48.0	100.5	71.1	0.	0.	1661.
1969	63.3	1123.5	453.5	437.6	649.5	96.5	39.5	129.8	63.3	204.1	970.7	761.5	46.1	94.8	72.4	0.	0.	1644.
1970	63.3	1086.0	413.9	430.3	551.0	131.2	66.7	207.7	63.3	73.0	693.3	567.6	40.9	43.8	42.3	0.	0.	1546.
1971	63.7	1099.3	511.7	646.1	488.6	46.2	100.2	201.7	63.2	128.8	686.0	536.5	37.6	47.6	46.3	0.	0.	1670.
1972	64.4	1180.9	455.1	536.3	656.9	32.3	43.8	171.8	63.8	195.3	944.7	736.2	44.3	102.5	63.7	0.	0.	1702.
1973	63.7	1101.3	389.3	626.3	621.7	83.5	78.5	197.3	63.7	85.5	561.5	476.5	53.7	25.5	26.6	0.	0.	1555.
1974	63.8	1149.9	346.1	554.5	599.5	56.8	66.6	172.4	63.5	246.3	939.8	720.6	46.7	102.5	71.7	0.	0.	1701.
1975	63.1	1051.7	425.6	413.2	618.3	90.1	64.9	130.4	63.1	160.4	865.2	680.3	44.0	81.7	60.7	0.	0.	1542.
1976	64.1	1150.5	468.6	551.5	591.5	87.4	79.2	231.3	63.4	78.5	744.4	628.3	41.0	40.4	37.8	0.	0.	1686.
1977	68.0	1209.6	508.9	351.6	838.0	42.5	59.7	178.6	56.5	265.6	1223.9	1011.8	48.2	108.2	59.3	0.	0.	1790.
1978	64.8	1037.8	350.7	400.5	560.6	58.9	111.5	102.8	58.8	160.3	800.9	628.5	37.2	70.4	67.7	0.	0.10	1456.
1979	67.3	1071.6	430.7	461.3	619.9	49.1	46.2	122.6	54.6	215.9	928.6	726.4	44.8	90.5	71.1	0.	0.	1573.
1980	65.2	1009.6	342.0	317.8	671.2	64.8	27.1	119.6	59.8	156.4	919.6	727.4	48.5	80.0	67.1	0.	0.10	1420.
1981	64.7	1263.4	504.9	433.8	686.4	157.2	85.8	237.6	61.2	171.0	932.7	722.7	50.9	103.6	80.0	0.	0.	1837.
1982	66.1	960.8	415.4	489.9	452.4	61.8	94.5	65.3	54.3	224.1	731.6	621.4	39.2	60.5	33.0	0.	0.10	1444.
1983	65.7	1233.1	498.8	539.1	704.5	51.8	54.7	165.2	56.2	225.9	1033.8	824.1	47.7	99.8	68.7	0.	0.	1803.
AVERAGE	64.6	1111.0	444.5	446.8	628.2	80.5	69.8	156.9	61.1	176.7	894.3	707.3	47.6	76.0	58.4	6.8	0.03	1616.

Table 63 SUMMARY OF RESULTS OF OPERATION STUDY (1/3)

Case 1

Target Year 1990

Target Year 2000

Source Facilities; Pedu-Muda, Ahning

Unit: 10⁶ m³

YEAR	MUDA DEMAND	KEDAH DEMAND	TOTAL OUTPUT	DEFICIT AFTER CUT	CUT RATE(%)	TOTAL DEFICIT
1961	63	1502	1205	3	40	360
1962	63	1437	924	2	60	576
1963	67	1635	849	48	75	854
1964	70	1465	871	5	65	664
1965	68	1480	947	3	65	601
1966	63	1266	1099	0	30	236
1967	63	1293	1356	0	0	0
1968	113	1451	1238	51	30	326
1969	63	1435	1039	0	50	459
1970	64	1364	1240	0	20	188
1971	63	1457	1520	0	0	0
1972	67	1496	1282	2	30	281
1973	63	1381	1182	0	30	262
1974	67	1533	1595	5	0	5
1975	63	1351	922	0	60	492
1976	67	1454	1162	2	40	359
1977	110	1542	1378	274	0	274
1978	79	1330	936	16	50	473
1979	98	1447	1059	39	50	487
1980	84	1288	919	23	50	453
1981	80	1574	1351	17	30	303
1982	94	1291	712	35	75	673
1983	109	1565	1470	48	15	205
MEAN	76	1436	1142	25	38	371

YEAR	MUDA DEMAND	KEDAH DEMAND	TOTAL OUTPUT	DEFICIT AFTER CUT	CUT RATE(%)	TOTAL DEFICIT
1961	63	1629	1335	0	40	357
1962	63	1579	931	0	75	711
1963	86	1768	1010	40	75	844
1964	86	1622	1022	18	65	686
1965	80	1610	987	14	75	702
1966	63	1395	1230	0	30	228
1967	63	1432	1332	0	20	163
1968	178	1590	1470	115	20	298
1969	65	1577	1190	0	50	452
1970	67	1480	1360	3	20	184
1971	68	1611	1495	3	20	187
1972	75	1636	1517	9	20	194
1973	66	1491	1300	0	30	256
1974	74	1696	1566	8	20	204
1975	63	1477	1137	0	50	403
1976	73	1619	1315	8	40	377
1977	187	1719	1490	415	0	415
1978	106	1478	1006	41	60	378
1979	170	1593	1202	108	50	568
1980	106	1437	987	44	60	556
1981	94	1768	1538	30	30	324
1982	153	1461	886	92	75	728
1983	147	1732	1418	86	35	461
MEAN	95	1583	1249	45	42	429

Source Facilities; Pedu-Muda, Ahning, Jeniang

YEAR	MUDA DEMAND	KEDAH DEMAND	TOTAL OUTPUT	DEFICIT AFTER CUT	CUT RATE(%)	TOTAL DEFICIT
1961	63	1502	1253	0	35	312
1962	63	1437	1117	0	40	383
1963	67	1635	1378	52	25	325
1964	70	1465	1124	3	40	411
1965	68	1480	1177	3	40	371
1966	63	1266	1137	0	25	192
1967	63	1293	1356	0	0	0
1968	113	1451	1513	51	0	51
1969	63	1435	1269	0	25	229
1970	64	1364	1428	0	0	0
1971	63	1457	1520	0	0	0
1972	67	1496	1563	0	2	2
1973	63	1381	1567	0	10	87
1974	67	1533	1598	2	0	2
1975	63	1351	1209	0	25	205
1976	67	1454	1429	2	10	92
1977	110	1542	1413	240	0	239
1978	79	1330	1073	16	35	236
1979	98	1447	1283	39	25	263
1980	84	1288	1052	19	35	320
1981	80	1574	1542	17	10	112
1982	94	1291	1010	35	40	375
1983	109	1565	1625	50	0	50
MEAN	76	1436	1323	23	18	189

YEAR	MUDA DEMAND	KEDAH DEMAND	TOTAL OUTPUT	DEFICIT AFTER CUT	CUT RATE(%)	TOTAL DEFICIT
1961	63	1629	1379	0	35	313
1962	63	1579	1263	0	40	379
1963	86	1768	1332	40	45	522
1964	86	1622	1176	18	50	532
1965	80	1610	1217	14	50	472
1966	63	1395	1268	0	25	190
1967	63	1432	1495	0	0	0
1968	178	1590	1653	115	0	115
1969	65	1577	1326	0	35	316
1970	67	1480	1544	3	0	3
1971	68	1611	1676	3	0	3
1972	75	1636	1702	9	0	9
1973	66	1491	1471	0	10	85
1974	74	1696	1762	8	0	8
1975	63	1477	1258	0	35	282
1976	73	1619	1592	8	10	100
1977	187	1719	1568	337	0	337
1978	106	1478	1165	41	40	399
1979	170	1593	1341	105	35	421
1980	106	1437	1161	41	40	382
1981	94	1768	1734	30	10	128
1982	153	1461	1181	94	40	433
1983	147	1732	1678	94	10	201
MEAN	95	1583	1433	42	22	245

Source Facilities; Pedu-Muda, Ahning, Jeniang, Beris

YEAR	MUDA DEMAND	KEDAH DEMAND	TOTAL OUTPUT	DEFICIT AFTER CUT	CUT RATE(%)	TOTAL DEFICIT
1961	63	1502	1342	0	25	223
1962	63	1437	1213	0	30	287
1963	67	1635	1345	36	30	358
1964	70	1465	1129	0	40	406
1965	68	1480	1269	3	30	279
1966	63	1266	1252	0	10	77
1967	63	1293	1356	0	0	0
1968	113	1451	1564	0	0	0
1969	63	1435	1498	0	0	0
1970	64	1364	1428	0	0	0
1971	63	1457	1520	0	0	0
1972	67	1496	1563	0	0	0
1973	63	1381	1444	0	0	0
1974	67	1533	1600	0	0	0
1975	63	1351	1414	0	0	0
1976	67	1454	1521	0	0	0
1977	110	1542	1516	136	0	136
1978	79	1330	1135	0	30	274
1979	98	1447	1251	71	25	295
1980	84	1288	1174	0	30	258
1981	80	1574	1630	0	0	0
1982	94	1291	1130	0	30	255
1983	109	1565	1675	0	0	0
MEAN	76	1436	1388	11	12	124

YEAR	MUDA DEMAND	KEDAH DEMAND	TOTAL OUTPUT	DEFICIT AFTER CUT	CUT RATE(%)	TOTAL DEFICIT
1961	63	1629	1424	0	30	268
1962	63	1579	1358	0	30	284
1963	86	1768	1247	71	50	607
1964	86	1622	1195	0	50	513
1965	80	1610	1322	0	40	367
1966	63	1395	1458	0	0	0
1967	63	1432	1495	0	0	0
1968	178	1590	1768	0	0	0
1969	65	1577	1461	0	20	181
1970	67	1480	1547	0	0	0
1971	68	1611	1679	0	0	0
1972	75	1636	1711	0	0	0
1973	66	1491	1556	0	0	0
1974	74	1696	1769	0	0	0
1975	63	1477	1540	0	0	0
1976	73	1619	1666	6	0	6
1977	187	1719	1633	272	0	272
1978	106	1478	1247	68	30	337
1979	170	1593	1385	106	30	377
1980	106	1437	1188	100	30	355
1981	94	1768	1742	120	0	120
1982	153	1461	1296	64	30	318
1983	147	1732	1795	83	0	83
MEAN	95	1583	1500	39	15	178

Source Facilities; Pedu-Muda, Ahning, Jeniang, Beris, Reman

YEAR	MUDA DEMAND	KEDAH DEMAND	TOTAL OUTPUT	DEFICIT AFTER CUT	CUT RATE(%)	TOTAL DEFICIT
1961	63	1502	1565	0	0	0
1962	63	1437	1404	0	10	98
1963	67	1635	1644	59	0	59
1964	70	1465	1433	0	10	102
1965	68	1480	1418	38	10	130
1966	63	1266	1252	0	10	77
1967	63	1293	1356	0	0	0
1968	113	1451	1564	0	0	0
1969	63	1435	1498	0	0	0
1970	64	1364	1428	0	0	0
1971	63	1457	1520	0	0	0
1972	67	1496	1563	0	0	0
1973	63	1381	1444	0	0	0
1974	67	1533	1600	0	0	0
1975	63	1351	1414	0	0	0
1976	67	1454	1521	0	0	0
1977	110	1542	1652	0	0	0
1978	79	1330	1318	0	10	91
1979	98	1447	1456	0	10	90
1980	84	1288	1286	0	10	66
1981	80	1574	1654	0	0	0
1982	94	1291	1300	0	10	85
1983	109	1565	1675	0	0	0
MEAN	76	1436	1477	4	3	35

YEAR	MUDA DEMAND	KEDAH DEMAND	TOTAL OUTPUT	DEFICIT AFTER CUT	CUT RATE(%)	TOTAL DEFICIT
1961	63	1629	1647	0	0	45
1962	63	1579	1453	0	20	189
1963	86	1768	1647	153	0	207
1964	86	1622	1400	0	30	308
1965	80	1610	1414	0	30	275
1966	63	1395	1420	0	5	38
1967	63	1432	1495	0	0	0
1968	178	1590	1768	0	0	0
1969	65	1577	1642	0	0	0
1970	67	1480	1547	0	0	0
1971	68	1611	1679	0	0	0
1972	75	1636	1711	0	0	0
1973	66	1491	1556	0	0	0
1974	74	1696	1769	0	0	0
1975	63	1477	1540	0	0	0
1976	73	1619	1692	0	0	0
1977	187	1719	1			

Table 64 SUMMARY OF RESULTS OF OPERATION STUDY (2/3)

Case 2

Target Year 1990

Target Year 2000

Source Facilities; Pedu-Muda, Ahning

Unit: 10⁶ m³

YEAR	MUDA DEMAND	KEDAH DEMAND	TOTAL OUTPUT	DEFICIT AFTER CUT	CUT RATE(%)	TOTAL DEFICIT	YEAR	MUDA DEMAND	KEDAH DEMAND	TOTAL OUTPUT	DEFICIT AFTER CUT	CUT RATE(%)	TOTAL DEFICIT	
1961	63	1502	1205	3	40	360	1961	63	1629	1335	0	40	357	
1962	63	1437	924	0	60	576	1962	63	1579	931	0	75	711	
1963	67	1635	849	47	75	853	1963	79	1768	1010	33	65	837	
1964	67	1465	871	2	65	661	1964	74	1622	1022	6	65	673	
1965	66	1480	947	1	65	599	1965	71	1610	987	5	75	693	
1966	63	1266	1099	0	30	230	1966	63	1395	1230	0	30	228	
1967	63	1293	1356	0	0	0	1967	63	1432	1332	0	20	163	
1968	91	1451	1238	29	30	304	1968	104	1590	1470	41	20	223	
1969	63	1435	1039	0	50	459	1969	65	1577	1190	0	50	452	
1970	64	1364	1240	0	20	188	1970	65	1480	1360	1	20	185	
1971	63	1457	1520	0	0	0	1971	67	1611	1495	2	20	183	
1972	67	1496	1282	2	30	281	1972	69	1636	1517	3	20	188	
1973	63	1381	1182	0	30	262	1973	66	1491	1300	0	30	256	
1974	67	1533	1595	5	0	5	1974	68	1696	1566	3	20	198	
1975	63	1391	922	0	60	492	1975	63	1477	1137	0	50	403	
1976	67	1454	1162	2	40	359	1976	68	1619	1315	3	40	372	
1977	83	1542	1378	248	0	248	1977	101	1719	1490	329	0	60	547
1978	71	1330	936	8	50	465	1978	76	1478	1006	11	60	484	
1979	74	1447	1059	14	40	442	1979	93	1593	1202	32	50	528	
1980	72	1288	919	12	50	293	1980	78	1437	987	15	60	303	
1981	70	1574	1351	12	30	293	1981	73	1768	1538	9	30	661	
1982	72	1291	1712	14	75	651	1982	86	1461	886	25	75	397	
1983	80	1565	1470	19	15	175	1983	83	1732	1418	22	35	397	
MEAN	69	1436	1142	18	38	364	MEAN	74	1583	1249	23	42	407	

Source Facilities; Pedu-Muda, Ahning, Jeniang

YEAR	MUDA DEMAND	KEDAH DEMAND	TOTAL OUTPUT	DEFICIT AFTER CUT	CUT RATE(%)	TOTAL DEFICIT	YEAR	MUDA DEMAND	KEDAH DEMAND	TOTAL OUTPUT	DEFICIT AFTER CUT	CUT RATE(%)	TOTAL DEFICIT
1961	63	1502	1253	0	35	312	1961	63	1629	1424	0	30	268
1962	63	1437	1117	0	40	383	1962	63	1579	1263	0	40	379
1963	67	1635	1378	56	25	324	1963	79	1768	1278	33	50	569
1964	67	1465	1124	2	40	408	1964	74	1622	1176	8	50	519
1965	66	1480	1177	1	40	369	1965	71	1610	1217	5	50	463
1966	63	1266	1137	0	25	182	1966	63	1395	1306	0	20	152
1967	63	1293	1356	0	0	0	1967	63	1432	1495	0	0	0
1968	91	1451	1513	29	0	29	1968	104	1590	1653	40	0	40
1969	63	1435	1269	0	25	229	1969	65	1577	1371	0	30	271
1970	64	1364	1428	0	0	0	1970	65	1480	1544	2	0	2
1971	63	1457	1520	0	0	0	1971	67	1611	1676	1	0	1
1972	67	1496	1563	0	0	0	1972	69	1636	1702	2	0	3
1973	63	1381	1357	0	10	87	1973	66	1491	1385	0	20	171
1974	67	1533	1598	2	0	2	1974	68	1696	1762	2	0	2
1975	63	1391	1209	0	25	205	1975	63	1477	1298	3	30	242
1976	67	1454	1429	2	10	92	1976	68	1619	1592	11	0	251
1977	83	1542	1413	213	0	213	1977	101	1719	1568	251	0	368
1978	71	1330	1073	8	35	328	1978	76	1478	1185	11	40	368
1979	74	1447	1283	14	25	239	1979	93	1593	1291	124	30	395
1980	72	1288	1052	8	35	309	1980	78	1437	1243	16	30	272
1981	70	1574	1542	7	10	102	1981	73	1768	1734	9	10	107
1982	72	1291	1010	14	40	353	1982	86	1461	1179	30	40	368
1983	80	1565	1625	20	0	20	1983	83	1732	1671	37	10	144
MEAN	69	1436	1323	16	18	182	MEAN	74	1583	1435	25	21	221

Source Facilities; Pedu-Muda, Ahning, Jeniang, Beris

YEAR	MUDA DEMAND	KEDAH DEMAND	TOTAL OUTPUT	DEFICIT AFTER CUT	CUT RATE(%)	TOTAL DEFICIT	YEAR	MUDA DEMAND	KEDAH DEMAND	TOTAL OUTPUT	DEFICIT AFTER CUT	CUT RATE(%)	TOTAL DEFICIT
1961	63	1502	1559	0	0	0	1961	63	1629	1424	0	30	268
1962	63	1437	1117	0	40	383	1962	63	1579	1358	0	30	284
1963	67	1635	1278	48	35	424	1963	79	1768	1255	57	50	592
1964	67	1465	1076	0	45	456	1964	74	1622	1182	0	50	513
1965	66	1480	1270	0	30	276	1965	71	1610	1313	0	0	367
1966	63	1266	1329	0	0	0	1966	63	1395	1458	0	0	0
1967	63	1293	1356	0	0	0	1967	63	1432	1495	0	0	0
1968	91	1451	1542	0	0	0	1968	104	1590	1693	0	0	0
1969	63	1435	1498	0	0	0	1969	65	1577	1642	0	0	0
1970	64	1364	1428	0	0	0	1970	65	1480	1545	0	0	0
1971	63	1457	1520	0	0	0	1971	67	1611	1678	0	0	0
1972	67	1496	1563	0	0	0	1972	69	1636	1705	0	0	0
1973	63	1381	1444	0	0	0	1973	66	1491	1356	0	0	0
1974	67	1533	1600	0	0	0	1974	68	1696	1764	0	0	0
1975	63	1391	1414	0	0	0	1975	63	1477	1540	0	0	0
1976	67	1454	1521	0	0	0	1976	68	1619	1503	0	20	184
1977	83	1542	1613	13	0	13	1977	101	1719	1672	147	0	147
1978	71	1330	1080	0	35	321	1978	76	1478	1285	0	30	266
1979	74	1447	1253	0	30	269	1979	93	1593	1344	70	30	342
1980	72	1288	1103	0	30	258	1980	78	1437	1250	8	30	265
1981	70	1574	1644	0	0	0	1981	73	1768	1838	3	0	3
1982	72	1291	1066	0	35	297	1982	86	1461	1229	64	30	318
1983	80	1565	1645	0	0	0	1983	83	1732	1773	42	0	42
MEAN	69	1436	1388	3	12	117	MEAN	74	1583	1500	17	15	156

Source Facilities; Pedu-Muda, Ahning, Jeniang, Beris, Reman

YEAR	MUDA DEMAND	KEDAH DEMAND	TOTAL OUTPUT	DEFICIT AFTER CUT	CUT RATE(%)	TOTAL DEFICIT	YEAR	MUDA DEMAND	KEDAH DEMAND	TOTAL OUTPUT	DEFICIT AFTER CUT	CUT RATE(%)	TOTAL DEFICIT
1961	63	1502	1565	0	0	0	1961	63	1629	1692	0	0	0
1962	63	1437	1500	0	0	0	1962	63	1579	1500	0	15	142
1963	67	1635	1559	36	10	143	1963	79	1768	1642	45	15	205
1964	67	1465	1430	0	10	102	1964	74	1622	1535	6	15	160
1965	66	1480	1423	31	10	123	1965	71	1610	1433	18	25	247
1966	63	1266	1252	0	10	77	1966	63	1395	1344	0	15	114
1967	63	1293	1356	0	0	0	1967	63	1432	1495	0	0	0
1968	91	1451	1542	0	0	0	1968	104	1590	1693	0	0	0
1969	63	1435	1498	0	0	0	1969	65	1577	1642	0	0	0
1970	64	1364	1428	0	0	0	1970	65	1480	1545	0	0	0
1971	63	1457	1520	0	0	0	1971	67	1611	1678	0	0	0
1972	67	1496	1563	0	0	0	1972	69	1636	1705	0	0	0
1973	63	1381	1444	0	0	0	1973	66	1491	1356	0	0	0
1974	67	1533	1600	0	0	0	1974	68	1696	1764	0	0	0
1975	63	1391	1414	0	0	0	1975	63	1477	1540	0	0	0
1976	67	1454	1521	0	0	0	1976	68	1619	1503	0	20	184
1977	83	1542	1626	0	0	0	1977	101	1719	1672	147	0	147
1978	71	1330	1309	0	10	92	1978	76	1478	1419	0	15	134
1979	74	1447	1432	0	10	90	1979	93	1593	1550	0	15	136
1980	72	1288	1275	0	10	86	1980	78	1437	1385	1	15	130
1981	70	1574	1644	0	0	0	1981	73	1768	1743	0	10	98
1982	72	1291	1363	0	0	0	1982	86	1461	1420	0	15	127
1983	80	1565	1645	0	0	0	1983	83	1732	1815	0	0	0
MEAN	69	1436	1474	3	3	31	MEAN	74	1583	1591	3	7	65

Table 65 SUMMARY OF RESULTS OF OPERATION STUDY (3/3)

Case 3

Target Year 1990

Target Year 2000

Source Facilities; Pedu-Muda, Ahning

Unit: 10⁶ m

YEAR	MUDA DEMAND	KEDAH DEMAND	TOTAL OUTPUT	DEFICIT AFTER CUT	CUT RATE(%)	TOTAL DEFICIT
1961	63	1502	1205	3	40	360
1962	63	1437	924	2	60	576
1963	64	1635	848	46	75	851
1964	64	1465	870	0	65	659
1965	64	1480	946	0	65	597
1966	63	1266	1099	0	30	230
1967	63	1293	1356	0	0	0
1968	67	1451	1238	5	30	280
1969	63	1435	1039	0	50	459
1970	63	1364	1240	0	20	188
1971	63	1457	1520	0	0	0
1972	64	1496	1281	0	30	279
1973	63	1381	1182	0	30	262
1974	64	1533	1513	4	0	4
1975	63	1351	922	0	60	492
1976	64	1454	1161	0	40	357
1977	66	1542	1378	230	0	230
1978	64	1330	935	2	50	459
1979	65	1447	1059	5	50	453
1980	64	1288	918	5	30	435
1981	64	1574	1351	1	30	287
1982	64	1291	712	6	70	644
1983	65	1565	1469	5	15	162
MEAN	64	1436	1141	14	38	359

YEAR	MUDA DEMAND	KEDAH DEMAND	TOTAL OUTPUT	DEFICIT AFTER CUT	CUT RATE(%)	TOTAL DEFICIT
1961	63	1629	1335	0	40	357
1962	63	1579	931	0	75	711
1963	65	1768	1005	24	75	828
1964	65	1622	1019	0	65	667
1965	64	1610	986	0	75	688
1966	63	1395	1230	0	30	228
1967	63	1432	1332	0	20	163
1968	68	1590	1469	7	20	189
1969	63	1577	1189	0	50	451
1970	63	1480	1360	0	20	183
1971	64	1611	1494	0	20	181
1972	64	1636	1515	0	20	185
1973	64	1491	1299	0	30	255
1974	64	1696	1564	0	20	196
1975	63	1437	1137	0	50	403
1976	64	1619	1314	0	40	369
1977	68	1719	1487	299	0	299
1978	65	1478	1004	2	60	539
1979	67	1593	1198	10	50	462
1980	65	1437	986	5	60	516
1981	65	1768	1537	1	30	296
1982	66	1461	884	8	70	643
1983	66	1732	1418	5	35	380
MEAN	65	1583	1247	16	42	400

Source Facilities; Pedu-Muda, Ahning, Jeniang

YEAR	MUDA DEMAND	KEDAH DEMAND	TOTAL OUTPUT	DEFICIT AFTER CUT	CUT RATE(%)	TOTAL DEFICIT
1961	63	1502	1253	0	35	312
1962	63	1437	1117	40	40	383
1963	64	1635	1319	52	25	320
1964	64	1465	1123	0	40	406
1965	64	1480	1176	0	40	367
1966	63	1266	1137	0	25	192
1967	63	1293	1356	0	0	0
1968	67	1451	1513	5	0	5
1969	63	1435	1269	0	25	228
1970	63	1364	1428	0	0	0
1971	63	1457	1520	0	0	0
1972	64	1496	1560	0	0	0
1973	63	1381	1357	0	10	87
1974	64	1533	1597	0	0	0
1975	63	1351	1209	0	25	205
1976	64	1454	1429	0	10	89
1977	66	1542	1412	196	0	196
1978	64	1330	1072	2	35	322
1979	65	1447	1283	5	25	229
1980	64	1288	1051	1	35	302
1981	64	1574	1541	1	10	97
1982	64	1291	1010	6	40	346
1983	65	1565	1625	6	0	6
MEAN	64	1436	1322	12	18	178

YEAR	MUDA DEMAND	KEDAH DEMAND	TOTAL OUTPUT	DEFICIT AFTER CUT	CUT RATE(%)	TOTAL DEFICIT
1961	63	1629	1424	0	30	268
1962	63	1579	1263	0	40	379
1963	65	1768	1277	21	50	556
1964	65	1622	1173	0	50	513
1965	64	1610	1215	0	50	459
1966	63	1395	1306	0	20	152
1967	63	1432	1495	0	0	0
1968	68	1590	1651	7	0	7
1969	63	1577	1370	0	30	270
1970	63	1480	1543	0	0	0
1971	64	1611	1675	0	0	0
1972	64	1636	1700	0	0	0
1973	64	1491	1384	0	20	170
1974	64	1696	1760	0	0	0
1975	63	1477	1298	0	30	242
1976	64	1619	1591	0	10	92
1977	68	1719	1566	221	0	221
1978	65	1478	1183	2	40	360
1979	67	1593	1288	101	30	372
1980	65	1437	1245	2	30	257
1981	65	1768	1733	1	10	100
1982	66	1461	1177	12	40	350
1983	66	1732	1676	15	10	122
MEAN	65	1583	1434	17	21	213

Source Facilities; Pedu-Muda, Ahning, Jeniang, Beris

YEAR	MUDA DEMAND	KEDAH DEMAND	TOTAL OUTPUT	DEFICIT AFTER CUT	CUT RATE(%)	TOTAL DEFICIT
1961	63	1502	1563	2	0	2
1962	63	1437	1117	40	40	383
1963	64	1635	1292	32	35	407
1964	64	1465	1073	0	45	456
1965	64	1480	1268	3	30	275
1966	63	1266	1329	0	0	0
1967	63	1293	1356	0	0	0
1968	67	1451	1518	0	0	0
1969	63	1435	1498	0	0	0
1970	63	1364	1428	0	0	0
1971	63	1457	1520	0	0	0
1972	64	1496	1560	0	0	0
1973	63	1381	1444	0	0	0
1974	64	1533	1597	0	0	0
1975	63	1351	1414	0	0	0
1976	64	1454	1538	0	0	0
1977	66	1542	1609	4	0	4
1978	64	1330	1074	0	35	320
1979	65	1447	1243	0	30	268
1980	64	1288	1095	0	30	258
1981	64	1574	1638	0	0	0
1982	64	1291	1100	0	30	256
1983	65	1565	1631	0	0	0
MEAN	64	1436	1386	2	12	114

YEAR	MUDA DEMAND	KEDAH DEMAND	TOTAL OUTPUT	DEFICIT AFTER CUT	CUT RATE(%)	TOTAL DEFICIT
1961	63	1629	1513	0	20	179
1962	63	1579	1341	0	30	301
1963	65	1768	1207	91	50	626
1964	65	1622	1173	0	50	513
1965	64	1610	1307	0	40	367
1966	63	1395	1458	0	0	0
1967	63	1432	1495	0	0	0
1968	68	1590	1658	0	0	0
1969	63	1577	1449	0	0	0
1970	63	1480	1543	0	0	0
1971	64	1611	1675	0	0	0
1972	64	1636	1700	0	0	0
1973	64	1491	1354	0	0	0
1974	64	1696	1760	0	0	0
1975	63	1477	1298	0	0	0
1976	64	1619	1540	0	0	0
1977	68	1719	1681	2	0	2
1978	65	1478	1225	50	30	318
1979	67	1593	1321	68	30	339
1980	65	1437	1242	5	30	260
1981	65	1768	1832	1	0	1
1982	66	1461	1221	52	30	306
1983	66	1732	1781	16	0	16
MEAN	65	1583	1500	20	13	147

Source Facilities; Pedu-Muda, Ahning, Jeniang, Beris, Reman

YEAR	MUDA DEMAND	KEDAH DEMAND	TOTAL OUTPUT	DEFICIT AFTER CUT	CUT RATE(%)	TOTAL DEFICIT
1961	63	1502	1565	0	0	0
1962	63	1437	1300	0	0	0
1963	64	1635	1637	63	0	62
1964	64	1465	1427	0	10	102
1965	64	1480	1425	26	10	118
1966	63	1266	1252	0	10	77
1967	63	1293	1356	0	0	0
1968	67	1451	1518	0	0	0
1969	63	1435	1498	0	0	0
1970	63	1364	1428	0	0	0
1971	63	1457	1520	0	0	0
1972	64	1496	1560	0	0	0
1973	63	1381	1444	0	0	0
1974	64	1533	1597	0	0	0
1975	63	1351	1297	0	0	0
1976	64	1454	1414	0	0	0
1977	66	1542	1518	0	0	0
1978	64	1330	1303	0	10	97
1979	65	1447	1422	0	10	86
1980	64	1288	1267	0	10	86
1981	64	1574	1638	0	0	0
1982	64	1291	1270	0	10	86
1983	65	1565	1631	0	0	0
MEAN	64	1436	1469	4	3	31

YEAR	MUDA DEMAND	KEDAH DEMAND	TOTAL OUTPUT	DEFICIT AFTER CUT	CUT RATE(%)	TOTAL DEFICIT
1961	63	1629	1692	0	0	0
1962	63	1579	1453	0	20	189
1963	65	1768	1700	26	10	133
1964	65	1622	1481	0	20	205
1965	64	1610	1487	0	20	181
1966	63	1395	1306	0	20	152
1967	63	1432	1495	0	0	0
1968	68	1590	1658	0	0	0
1969	63	1577	1640	0	0	0
1970	63	1480	1543	0	0	0
1971	64	1611	1675	0	0	0
1972	64	1636	1700	0	0	0
1973	64	1491	1554	0	0	0
1974	64	1696	1760	0	0	0
1975	63	1477	1540	0	0	0
1976	64	1619	1683	0	0	0
1977	68	1719	1786	0	0	0
1978	65	1478	1364	0	20	179
1979	67					

Table 66 NET WATER OUTPUT OF PEDU-MUDA,
AHNING AND MENGKUANG DAMS

Unit: 10^6 m^3

	AVERAGE ANNUAL NET WATER OUTPUT /*					
	1983		1990		2000	
	Kedah	Muda	Kedah	Muda	Kedah	Muda
Deficit	1087	5	1072	18	1115	43
Pedu + Muda	679		668		671	
Ahning			46		45	
Mengkuang				6		14
Remaining Deficit	408	5	358	12	399	29

Remark; *: Average of 23 years from 1961 to 1983

Table 67 NET WATER OUTPUT OF JENIANG AND BERIS

(1) Case 1 (Muda Priority)

	Average Annual Net Water Output			
	1990		2000	
	Kedah	Muda	Kedah	Muda
Deficit ^{/1}	358	12	399	29
Jeniang	182		185	
Beris	55	10	40	26
Remaining deficit	121	2	174	3

(2) Case 2 (Intermediate)

	Average Annual Net Water Output			
	1990		2000	
	Kedah	Muda	Kedah	Muda
Deficit ^{/1}	358	12	399	29
Jeniang	182		187	
Beris	60	5	55	10
Remaining deficit	116	7	157	19

(3) Case 3 (Kedah Priority)

	Average Annual Net Water Output			
	1990		2000	
	Kedah	Muda	Kedah	Muda
Deficit ^{/1}	358	12	399	29
Jeniang	182		187	
Beris	62	1	64	2
Remaining deficit	114	11	148	27

Remark; ^{/1} : Deficit deducted by the outputs of the Pedu-Muda, Ahning and Mengkuang dams as shown in Table 66.

Table 68 NET WATER OUTPUT OF COMBINATIONS FOR
CASE 1 IN 2000 (Muda Priority)

Unit: 10^6 m^3

Source facilities	Combinations					
	(e)	(f)	(g)	(h)	(i)	(j)
	Jeniang Beris Reman	Jeniang Beris Tawar-Muda	Jeniang Beris Khlong Thepha	Jeniang Beris Reman Khlong Thepha	Jeniang Beris Reman Khlong Thepha Tawar-Muda	Jeniang Reman
Target deficit						
Kedah	399	399	399	399	399	399
Muda	29	29	29	29	29	29
Net Water Output						
Jeniang	185	185	185	185	185	185
Beris	66	66	66	66	66	
Reman	97			97	97	114
Tawar-Muda		23			3	
Khlong Thepha			43	30	30	
Remaining Deficit						
Kedah	77	151	130	47	44	126
Muda	3	3	3	3	3	3

Table 69 NET WATER OUTPUT OF COMBINATIONS FOR
CASE 2 IN 2000 (Intermediate)

Unit: 10^6 m^3

	Combinations				
	(e)	(f)	(g)	(h)	(i)
Source facilities	Jeniang Beris Reman	Jeniang Beris Tawar Muda	Jeniang Beris Khlong Thepha	Jeniang Beris Reman Khlong Thepha	Jeniang Beris Reman Khlong Thepha Tawar Muda
Target deficit					
Kedah	399	399	399	399	399
Muda	29	29	29	29	29
Net Water Output					
Jeniang	187				
Beris	65				
Reman	83				
Tawar Muda					
Khlong Thepha					
Remaining deficit					
Kedah	74				
Muda	19				

Table 70 NET WATER OUTPUT OF COMBINATIONS FOR
CASE 3 IN 2000 (Kedah Priority)

Unit: 10⁶ m³

Source facilities	Combinations				
	(e)	(f)	(g)	(h)	(i)
	Jeniang Beris Reman	Jeniang Beris Tawar Muda	Jeniang Beris Khlong Thepha	Jeniang Beris Reman Khlong Thepha	Jeniang Beris Reman Khlong Thepha Tawar Muda
Target deficit					
Kedah	399	399	399	399	399
Muda	29	29	29	29	29
Net Water Output					
Jeniang	187	187	187	187	187
Beris	66	66	66	66	66
Reman	83			83	83
Tawar Muda		19			3
Khlong Thepha			26	30	30
Remaining deficit					
Kedah	65	129	122	35	32
Muda	27	27	27	27	27

Table 71 REVISED ANNUAL WATER DEMAND

(1) For Case A Irrigation and Revised D & I Water Demands Unit: 10^6 m^3

Description	1983	1990	2000
Kedah river system			
Tributary	32	41	67
MADA main	1,309	1,278	1,243
Main minor			
fringe	23	21	21
main stream	0	1	6
D & I	33	55	137
Total	1,397	1,396	1,474
Muda-Perai river system			
Tributary	49	85	136
Main minor			
Kedah	58	97	98
Pulau Pinang	300 (212)	261 (185)	261 (185)
D & I			
Kedah	10	21	59
Pulau Pinang	141 (37)	191 (41)	333 (153)
Total	558	655	887
Grand Total	1,955	2,051	2,361

(2) For Case B Irrigation and Revised D & I Water Demands

Description	1983	1990	2000
Kedah river system			
Tributary	32	32	33
MADA main	1,309	1,278	1,243
Main minor			
fringe	23	21	21
main stream	0	0	0
D & I	33	55	137
Total	1,397	1,386	1,434
Muda-Perai river system			
Tributary	49	50	59
Main minor			
Kedah	58	58	58
Pulau Pinang	300 (212)	261 (185)	261 (185)
D & I			
Kedah	10	21	59
Pulau Pinang	141 (37)	191 (41)	333 (152)
Total	558	581	770
Grand Total	1,955	1,967	2,204

Remark: Figures between parentheses show the withdrawals from the Muda river.

Table 72 MONTHLY WATER DEFICIT FOR KEDAH RIVER BASIN
WITHOUT NEW MINOR IRRIGATION FOR 1990

Unit: 10^6 m^3

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1961	0.	175.6	246.8	111.5	101.2	161.1	175.3	131.2	52.3	0.	21.0	34.8	1210.7
1962	0.	196.2	321.2	151.0	59.8	175.9	63.8	95.1	0.	2.6	38.9	49.1	1153.5
1963	0.	214.5	330.6	245.1	145.9	153.4	190.1	141.6	27.4	0.	2.2	22.0	1472.8
1964	6.6	215.6	328.5	207.3	65.3	177.7	77.7	128.6	9.3	4.0	0.	25.3	1245.8
1965	3.2	186.7	287.8	125.8	152.5	133.0	165.9	97.5	4.5	0.	12.9	0.	1169.8
1966	0.	145.9	237.9	182.0	34.6	78.2	92.2	111.7	44.0	0.	0.	0.	946.5
1967	0.	146.4	345.9	110.5	10.4	109.1	42.8	70.6	34.4	0.	6.7	0.	876.9
1968	0.	191.5	314.1	103.6	41.6	103.4	69.6	128.6	4.7	0.	10.5	3.2	970.8
1969	0.	171.6	305.6	210.5	79.6	93.6	98.4	129.5	0.	0.	0.	0.	1088.8
1970	0.	182.9	302.5	182.3	81.1	100.4	87.8	47.4	17.6	0.	0.	0.	1002.0
1971	0.	138.7	148.0	273.7	55.2	77.0	87.3	92.0	16.4	0.	0.	0.	888.4
1972	0.	139.0	297.0	97.1	49.2	135.0	195.8	97.1	19.0	0.	0.	0.	1029.2
1973	0.	169.5	319.1	86.4	25.9	52.9	109.5	69.4	0.	0.	9.2	0.	841.8
1974	0.	181.6	316.1	222.1	0.	98.2	125.0	87.2	22.6	0.	18.7	3.9	1075.4
1975	0.	172.9	267.0	184.8	26.1	123.3	171.5	46.0	21.7	0.	15.8	0.	1029.0
1976	0.	174.0	294.1	172.4	3.8	143.4	85.0	101.8	0.	0.	0.	0.	974.5
1977	0.	170.3	358.8	261.6	74.9	84.4	148.3	102.1	3.1	0.	27.5	21.6	1252.6
1978	0.	184.1	346.7	173.2	87.1	112.9	30.2	57.8	0.7	0.	18.3	11.8	1022.8
1979	0.	198.3	350.5	116.9	108.6	71.2	110.6	114.0	0.	0.	0.	3.0	1073.0
1980	0.	205.1	319.8	100.6	127.9	88.4	181.7	33.1	0.	0.	0.	0.	1056.5
1981	0.	179.2	306.4	142.5	49.2	121.2	120.6	170.7	40.4	13.8	18.8	31.5	1194.4
1982	0.	185.8	287.2	116.8	46.1	73.9	30.6	131.0	0.	0.	1.6	7.2	880.2
1983	0.	193.3	305.3	298.2	78.7	78.1	108.9	26.5	0.	0.	18.4	0.	1107.4
MEAN	0.4	179.1	301.6	168.5	66.3	110.7	111.7	96.1	13.8	0.9	9.6	9.3	1068.0

Table 73 MONTHLY WATER DEFICIT FOR KEDAH RIVER BASIN
WITHOUT NEW MINOR IRRIGATION FOR 2000

Unit: 10^6 m^3

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1961	0.1	190.5	259.7	104.8	111.7	165.3	162.7	109.9	56.0	0.	22.5	38.2	1221.4
1962	0.5	212.6	328.8	160.6	59.8	173.7	62.6	85.3	0.9	3.5	40.0	57.6	1185.9
1963	7.0	233.3	337.4	269.3	131.2	165.6	194.1	145.2	32.2	0.	0.	24.4	1539.7
1964	18.3	234.3	355.2	206.6	68.7	191.9	65.3	126.7	8.8	4.9	0.	31.0	1311.6
1965	14.7	204.2	304.3	128.3	162.9	127.2	136.4	102.6	4.5	0.	10.4	0.	1195.5
1966	0.	156.5	248.7	196.9	36.3	80.4	93.7	109.6	16.4	0.	0.	0.	938.4
1967	0.	157.9	362.9	126.8	11.9	116.1	37.6	67.8	0.1	0.	7.0	0.	888.1
1968	0.	205.5	331.0	90.3	53.5	110.9	73.8	123.3	0.4	0.	6.4	3.7	998.9
1969	0.	185.3	296.8	225.0	78.4	95.1	99.3	129.1	0.	0.	0.	0.	1109.1
1970	0.	197.0	323.6	191.8	71.8	85.7	71.5	36.4	17.8	0.	0.	0.	993.3
1971	0.	151.2	159.1	278.8	50.3	84.7	93.3	87.2	22.9	0.	0.	0.	927.6
1972	0.	151.4	315.4	103.7	56.8	134.1	196.8	83.8	19.4	0.	0.	0.	1061.4
1973	0.	183.2	335.7	81.1	9.2	54.6	109.6	38.6	0.	0.	9.4	0.0	821.4
1974	0.	195.9	332.9	235.6	0.	107.9	124.8	50.9	23.4	0.	19.1	5.0	1095.6
1975	0.	185.1	280.9	174.3	28.2	124.2	166.7	37.8	22.1	0.	10.2	0.	1029.6
1976	0.	187.9	310.9	189.7	5.4	152.8	82.7	93.2	0.3	0.	0.	0.	1022.8
1977	0.	183.5	377.6	288.1	65.0	103.8	156.4	101.0	4.0	0.	28.3	25.5	1333.2
1978	0.	200.6	368.9	167.7	82.8	110.6	28.8	58.4	1.6	0.	19.6	13.4	1052.4
1979	0.	215.4	372.3	125.0	105.2	78.3	112.1	93.5	0.	0.	0.	1.3	1103.0
1980	0.	218.3	323.7	105.0	137.8	101.9	176.4	24.9	0.	0.	0.	0.	1087.9
1981	0.	193.3	325.2	155.3	55.8	132.9	118.6	165.0	67.3	14.9	15.1	37.0	1280.5
1982	4.2	203.3	301.8	121.8	50.6	74.0	30.6	133.7	0.	0.	2.2	7.8	930.0
1983	0.	208.9	323.3	318.9	85.9	84.9	89.0	26.3	0.	0.	18.8	0.	1155.9
MEAN	1.9	193.7	316.4	175.9	66.1	115.5	107.9	88.3	13.0	1.0	9.1	10.6	1099.4

Table 74

MONTHLY WATER DEFICIT FOR MUDA RIVER BASIN FOR 1990
(REVISED D&I AND WITH NEW MINOR IRRIGATION)Unit: 10^6 m^3

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1961	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1962	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1963	0.	0.	1.9	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.9
1964	0.	0.	4.8	0.	0.	0.	0.	0.	0.	0.	0.	0.	4.8
1965	0.	0.	3.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	3.1
1966	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1967	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1968	0.	0.	16.5	16.1	2.6	16.0	0.	0.	0.	0.	0.	0.	51.3
1969	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1970	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1971	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1972	0.	0.	2.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.0
1973	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1974	0.	0.	1.5	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.5
1975	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1976	0.	0.	0.	2.4	0.	0.	0.	0.	0.	0.	0.	0.	2.4
1977	0.	0.	20.8	23.2	2.1	0.6	1.2	0.	0.	0.	0.	0.	47.9
1978	0.	0.	12.9	2.1	0.	0.	0.	0.	0.	0.	0.	0.	15.0
1979	0.	0.	28.5	7.2	0.	0.	0.7	0.	0.	0.	0.	0.	36.3
1980	0.	0.	13.0	6.1	0.	0.	0.	0.	0.	0.	0.	0.	19.1
1981	0.	0.	17.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	17.0
1982	0.	0.	26.6	5.8	0.	0.	0.	0.	0.	0.	0.	0.	32.4
1983	0.	0.	19.7	28.3	0.	0.	0.	0.	0.	0.	0.	0.	48.0
MEAN	0.	0.	7.3	4.0	0.2	0.7	0.1	0.	0.	0.	0.	0.	12.3

Table 75

MONTHLY WATER DEFICIT FOR MUDA RIVER BASIN FOR 2000
(REVISED D&I AND WITH NEW MINOR IRRIGATION)Unit: 10^6 m^3

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1961	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1962	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1963	0.	0.	5.8	2.5	0.	0.	0.	0.	0.	0.	0.	0.	8.2
1964	0.	0.	10.9	1.7	0.	0.	0.	0.	0.	0.	0.	0.	12.6
1965	0.	0.	9.7	0.	0.	0.	0.	0.	0.	0.	0.	0.	9.7
1966	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1967	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1968	0.	0.	24.0	22.7	7.6	34.3	0.	0.	0.	0.	0.	0.	90.6
1969	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1970	0.	0.	1.5	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.5
1971	0.	0.	0.	0.	0.	1.0	0.	0.	0.	0.	0.	0.	1.0
1972	0.	0.	6.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	6.1
1973	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1974	0.	0.	5.3	0.2	0.	0.	0.	0.	0.	0.	0.	0.	5.5
1975	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1976	0.	0.	0.	5.7	0.	0.	0.	0.	0.	0.	0.	0.	5.7
1977	0.	0.	29.7	34.7	10.4	4.6	14.7	0.	0.	0.	0.	0.	94.1
1978	0.	0.	21.4	4.3	0.	0.	0.	0.	0.	0.	0.	0.	25.6
1979	0.	0.	42.6	16.8	0.	0.	6.0	0.	0.	0.	0.	0.	65.4
1980	0.	0.	22.1	10.1	0.	0.	0.6	0.	0.	0.	0.	0.	32.9
1981	0.	0.	24.5	0.	0.	0.	0.	0.	0.	0.	0.	0.	24.5
1982	0.	0.6	49.3	13.8	0.	0.	0.	0.	0.	0.	0.	0.	63.6
1983	0.	0.	27.9	44.0	0.	0.3	0.	0.	0.	0.	0.	0.	72.1
MEAN	0.	0.0	12.2	6.8	0.8	1.8	0.9	0.	0.	0.	0.	0.	22.6

Table 76 MONTHLY WATER DEFICIT FOR MUDA RIVER BASIN FOR 1990
(REVISED D&I AND WITHOUT NEW MINOR IRRIGATION)

Unit: 10^6 m^3

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1961	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1962	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1963	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1964	0.	0.	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1
1965	0.	0.	0.5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.5
1966	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1967	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1968	0.	0.	8.1	8.6	0.5	8.7	0.	0.	0.	0.	0.	0.	25.9
1969	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1970	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1971	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1972	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1973	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1974	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1975	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1976	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1977	0.	0.	12.8	16.6	0.4	0.	0.	0.	0.	0.	0.	0.	29.8
1978	0.	0.	6.2	0.6	0.	0.	0.	0.	0.	0.	0.	0.	6.8
1979	0.	0.	21.5	4.9	0.	0.	0.	0.	0.	0.	0.	0.	26.3
1980	0.	0.	6.4	3.3	0.	0.	0.	0.	0.	0.	0.	0.	9.7
1981	0.	0.	9.8	0.	0.	0.	0.	0.	0.	0.	0.	0.	9.8
1982	0.	0.	18.9	4.3	0.	0.	0.	0.	0.	0.	0.	0.	23.2
1983	0.	0.	11.9	21.1	0.	0.	0.	0.	0.	0.	0.	0.	32.9
MEAN	0.	0.	4.2	2.6	0.0	0.4	0.	0.	0.	0.	0.	0.	7.2

Table 77 MONTHLY WATER DEFICIT FOR MUDA RIVER BASIN FOR 2000
(REVISED D&I AND WITHOUT NEW MINOR IRRIGATION)

Unit: 10^6 m^3

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1961	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1962	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1963	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1964	0.	0.	2.6	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.6
1965	0.	0.	1.9	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.9
1966	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1967	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1968	0.	0.	12.0	11.2	1.4	19.2	0.	0.	0.	0.	0.	0.	43.8
1969	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1970	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1971	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1972	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1973	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1974	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1975	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1976	0.	0.	0.	1.2	0.	0.	0.	0.	0.	0.	0.	0.	1.2
1977	0.	0.	18.4	23.1	3.4	0.6	5.1	0.	0.	0.	0.	0.	50.5
1978	0.	0.	9.6	1.8	0.	0.	0.	0.	0.	0.	0.	0.	11.4
1979	0.	0.	32.7	11.0	0.	0.	0.9	0.	0.	0.	0.	0.	44.5
1980	0.	0.	10.9	5.9	0.	0.	0.	0.	0.	0.	0.	0.	16.8
1981	0.	0.	13.4	0.	0.	0.	0.	0.	0.	0.	0.	0.	13.4
1982	0.	0.5	34.0	8.8	0.	0.	0.	0.	0.	0.	0.	0.	43.3
1983	0.	0.	16.9	32.4	0.	0.	0.	0.	0.	0.	0.	0.	49.3
MEAN	0.	0.0	6.6	4.1	0.2	0.9	0.3	0.	0.	0.	0.	0.	12.1

Table 78 WATER DEFICIT IN MINOR IRRIGATION SCHEMES IN THE MUDA MAIN STREAM FOR CASE A IRRIGATION DEMAND

	No Project	Alternatives		
		1	2	3
1983				
Frequency	8/23			
<u>Average annual deficit Demand</u>	3%			
<u>Monthly maximum deficit Demand</u>	65%			
1990				
Frequency	14/23	1/23	7/23	14/23
<u>Average annual deficit Demand</u>	4%	nil	0.3%	4%
<u>Monthly maximum deficit Demand</u>	65%	nil	10%	65%
2000				
Frequency	16/23	1/23	8/23	17/23
<u>Average annual deficit Demand</u>	8%	nil	1%	8%
<u>Monthly maximum deficit Demand</u>	90%	nil	30%	90%

Table 79 WATER DEFICIT IN MINOR IRRIGATION SCHEMES IN THE MUDA MAIN STREAM FOR CASE B IRRIGATION DEMAND

	No Project	Alternatives		
		1	2	3
1983				
Frequency	8/23			
<u>Average annual deficit Demand</u>	3%			
<u>Monthly maximum deficit Demand</u>	65%			
1990				
Frequency	10/23	1/23	6/23	10/23
<u>Average annual deficit Demand</u>	3%	nil	0.4%	2%
<u>Monthly maximum deficit Demand</u>	60%	nil	15%	50%
2000				
Frequency	11/23	1/23	7/23	11/23
<u>Average annual deficit Demand</u>	5%	nil	1%	4%
<u>Monthly maximum deficit Demand</u>	90%	nil	30%	75%

Table 80 POSSIBLE OFF-SEASON CROP AREA IN THE MADA AREA FOR CASE A

Source facilities	Average Crop Area					
	1983		1990		2000	
	(%)	(ha)	(%)	(ha)	(%)	(ha)
Pedu + Muda	54	23,800				
+ Ahning			60	94,000	56	53,200
+ Jeniang			80 - 82	76,100 - 78,000	72 - 77	68,500 - 73,200
+ Beris			88	83,700	80 - 84	76,100 - 80,000
+ Reman			97	92,200	90 - 92	85,600 - 87,500
+ K. Thepha			100	95,100	93	88,400
+ Merbok			100	95,100	96	91,300

Remarks; 1) Frequency of deficit year : 5/23
 2) Proportion of annual deficit to demand for 23-year average : 1%
 3) Maximum monthly water deficit to the water demand of the planted area : 20%

Table 81 POSSIBLE OFF-SEASON CROP AREA IN THE MADA AREA FOR CASE B

Source facilities	Proportion of Crop Area					
	1983		1990		2000	
	(%)	(ha)	(%)	(ha)	(%)	(ha)
Pedu + Muda	54	51,300				
+ Ahning			61	58,000	60	57,000
+ Jeniang			81 - 83	77,000 - 78,900	77 - 80	73,200 - 76,100
+ Beris			89	84,600	85 - 88	80,800 - 83,700
+ Reman			98	93,200	94	89,400
+ K. Thepha			100	95,100	96	91,300
+ Merbok			100	95,100	99	94,100

Remarks; 1) Frequency of deficit year : 5/23
 2) Proportion of annual deficit to demand for 23-year average : 1%
 3) Maximum monthly water deficit to the water demand of the planted area : 20%

Table 82 NET WATER OUTPUT AND REMAINING DEFICIT FOR CASE A

	1990		2000	
	Kedah	Muda	Kedah	Muda
Alternative 1				
<u>Target Deficit</u>	<u>358</u>	<u>12</u>	<u>399</u>	<u>23</u>
Jeniang	182		185	
Beris	53	12	43	23
Reman	89		97	
K. Thepha	28		30	
Remaining Deficit	6	0	42	0
Alternative 2				
<u>Target Deficit</u>	<u>358</u>	<u>12</u>	<u>399</u>	<u>23</u>
Jeniang	182		185	
Beris	54	11	46	20
Reman	89		97	
K. Thepha	28		30	
Remaining Deficit	5	1	41	3
Alternative 3				
<u>Target Deficit</u>	<u>358</u>	<u>12</u>	<u>399</u>	<u>23</u>
Jeniang	182		187	
Beris	62		66	
Reman	83		83	
K. Thepha	26		26	
Remaining Deficit	5	12	37	23
Merbok		12		23
Remaining Deficit	5	0	37	0

Table 83 NET WATER OUTPUT AND REMAINING DEFICIT FOR CASE B

	1990		2000	
	Kedah	Muda	Kedah	Muda
Alternative 1				
<u>Target Deficit</u>	354	7	384	12
Jeniang	182		185	
Beris	58	7	54	12
Reman	83		83	
K. Thepha	26		26	
Remaining Deficit	5	0	36	0
Alternative 2				
<u>Target Deficit</u>	354	7	384	12
Jeniang	182		185	
Beris	59	6	57	9
Reman	83		83	
K. Thepha	26		26	
Remaining Deficit	4	1	33	3
Alternative 3				
<u>Target Deficit</u>	354	7	384	12
Jeniang	182		187	
Beris	62		66	
Reman	83		83	
K. Thepha	26		26	
Remaining Deficit	1	7	22	12
Merbok		7		12
Remaining Deficit	1	0	22	0

Table 84 AVERAGE ANNUAL WATER DEFICIT BY CAUSE BY AFFECTED AREA FOR CASE A IRRIGATION AND REVISED D & I WATER DEMANDS

Unit: 10⁶ m³

Cause of Water Deficit	Affected Area by Water Deficit							
	Kedah River System				Muda-Perai River System			
	MADA main	Main minor	D&I	Total	Kedah	P.Pinang	D&I	Total
1983 Kedah System								
MADA main	383.3	6.7	0	390				
Main minor	6.9	0.1	0	7				
Tributary minor	6.9	0.1	0	7				
D&I	4.9	0.1	0	5				
Total	402.0	7.0	0	409				
Muda-Perai System								
. Kedah: Main minor					0.2	0.8	0	1
Tributary minor					0.2	0.8	0	1
D&I					0	0	0	0
. P.Pinang: Main minor					0.9	3.1	0	4
D&I					0.2	0.8	0	1
Total					1.5	5.5	0	7
1990 Kedah System								
MADA main	338.2	5.8	0	344				
Main minor	6.9	0.1	0	7				
Tributary minor	6.9	0.1	0	7				
D&I	0	0	0	0(+46)				
Total	352.0	6.0	0	358(404)				
Muda-Perai System								
. Kedah: Main minor					1.0	2.0	0	3
Tributary minor					1.4	2.6	0	4
D&I					0.7	1.3	0	2
. P.Pinang: Main minor					1.0	2.0	0	3
D&I					0	0	0	0(+5)
Total					4.1	7.9	0	12(17)
2000 Kedah System								
MADA main	332.8	7.2	0	340				
Main minor	8.8	0.2	0	9				
Tributary minor	19.6	0.4	0	20				
D&I	15.7	0.3	0	16(+45)				
Maintenance flow	13.7	0.3	0	14				
Total	390.6	8.4	0	399(444)				
Muda-Perai System								
. Kedah: Main minor					1.0	2.0	0	3
Tributary minor					3.5	6.5	0	10
D&I					0.7	1.3	0	2
. P. Pinang: Main minor					1.0	2.0	0	3
D&I					1.7	3.3	0	5(+12)
Total					8.0	15.0	0	23(35)

Remark: Figures between parentheses in row of D&I indicate supply from Ahning or Mengkuang dam, those in row of total indicate deficit if Ahning and Mengkuang dams are not operated.

Table 85 AVERAGE ANNUAL WATER DEFICIT BY CAUSE BY AFFECTED AREA FOR
CASE B IRRIGATION AND REVISED D & I WATER DEMANDS

Unit: 10^6 m^3

Cause of Water Deficit	Affected Area by Water Deficit							
	Kedah River System				Muda-Perai River System			
	MADA main	Main minor	D&I	Total	Main Kedah	minor P.Pinang	D&I	Total
1983 Kedah System								
MADA main	383.3	6.7	0	390				
Main minor	6.9	0.1	0	7				
Tributary minor	6.9	0.1	0	7				
D&I	4.9	0.1	0	5				
Total	402.0	7.0	0	409				
Muda-Perai System								
. Kedah: Main minor					0.2	0.8	0	1
Tributary minor					0.2	0.8	0	1
D&I					0	0	0	0
. P.Pinang: Main minor					0.9	3.1	0	4
D&I					0.2	0.8	0	1
Total					1.5	5.5	0	7
1990 Kedah System								
MADA main	334.5	5.5	0	340				
Main minor	6.9	0.1	0	7				
Tributary minor	6.9	0.1	0	7				
D&I	0	0	0	0(+46)				
Total	348.3	5.7	0	354(400)				
Muda-Perai System								
. Kedah: Main minor					0.2	0.8	0	1
Tributary minor					0.2	0.8	0	1
D&I					0.5	1.5	0	2
. P.Pinang: Main minor					0.7	2.3	0	3
D&I					0	0	0	0(+4)
Total					1.6	5.4	0	7 (11)
2000 Kedah System								
MADA main	334.4	5.6	0	340				
Main minor	6.9	0.1	0	7				
Tributary minor	6.9	0.1	0	7				
D&I	15.7	0.3	0	16(+45)				
Maintenance flow	13.8	0.2	0	14				
Total	377.7	6.3	0	384(429)				
Muda-Perai System								
. Kedah: Main minor					0.2	0.8	0	1
Tributary minor					0.2	0.8	0	1
D&I					0.5	1.5	0	2
. P.Pinang: Main minor					0.7	2.3	0	3
D&I					1.2	3.8	0	5(+9)
Total					2.8	9.2	0	12 (21)

Remark; Figures between parentheses in row of D&I indicate supply from Ahning or Mengkuang dam, those in row of total indicate deficit if Ahning and Mengkuang dams are not operated.

Table 86 ALLOCATION OF NET WATER OUTPUT

Source Facility	Cause of Water Deficit	
	Kedah River	Muda-Perai River
Jeniang/Naok	MADA Minor D&I Maintenance flow	
Beris	Tributary MADA Minor D&I Maintenance flow	Tributary Minor D&I
Tawar-Muda	MADA Minor D&I Maintenance flow	
Khlong Thepha	MADA Minor D&I Maintenance flow	
Merbok		Tributary Minor D&I

Remarks; MADA = MADA irrigation
 Minor = Minor irrigation of main stream
 Tributary = Minor irrigation of tributary
 D&I = D&I water supply
 Maintenance flow = River maintenance flow only for High Growth Case

Table 87 NET WATER OUTPUT OF SOURCE FACILITIES
BY CAUSE OF WATER DEFICIT
(ALTERNATIVE 1, MUDA PRIORITY) (1/6)

Unit: 10^6 m^3

Cause of Water Deficit	Jeniang System		Beris	
	Case A	Case B	Case A	Case B
<u>1990</u>				
Kedah System				
MADA	178.4	178.3	45.1	50.0
Main minor	3.6	3.7	0.9	1.0
Tributary minor			7.0	7.0
D & I			0.0	0.0
Sub-total	182.0	182.0	53.0	58.0
Muda-Perai				
Kedah				
Main minor			3.0	1.0
Tributary minor			4.0	1.0
D & I			2.0	2.0
Pulau Pinang				
Main minor			3.0	3.0
D & I			0.0	0.0
Sub-total			12.0	7.0
Total	182.0	182.0	65.0	65.0
<u>2000</u>				
Kedah System				
MADA	166.0	166.8	20.6	42.4
Main minor	4.4	3.4	0.6	0.9
Tributary minor			20.0	7.0
D & I	7.8	7.9	1.0	2.0
Maintenance flow	6.8	6.9	0.8	1.7
Sub-total	185.0	185.0	43.0	54.0
Muda-Perai System				
Kedah				
Main minor			3.0	1.0
Tributary minor			10.0	1.0
D & I			2.0	2.0
Pulau Pinang				
Main minor			3.0	3.0
D & I			5.0	5.0
Sub-total			23.0	12.0
Total	185.0	185.0	66.0	66.0

Table 88 NET WATER OUTPUT OF SOURCE FACILITIES
 BY CAUSE OF WATER DEFICIT
 (ALTERNATIVE 2, EVEN DISTRIBUTION) (2/6)

Unit: 10⁶ m³

Cause of Water Deficit	Jeniang System		Beris	
	Case A	Case B	Case A	Case B
<u>1990</u>				
Kedah System				
MADA	178.4	178.4	46.1	51.0
Main minor	3.6	3.6	0.9	1.0
Tributary minor			7.0	7.0
D & I				
Sub-total	182.0	182.0	54.0	59.0
Muda-Perai System				
Kedah				
Main minor			2.5	0.8
Tributary minor			4.0	1.0
D & I			2.0	2.0
Pulau Pinang				
Main minor			2.5	2.2
D & I				0.0
Sub-total			11.0	6.0
Total	182.0	182.0	65.0	65.0
<u>2000</u>				
Kedah System				
MADA	166.0	166.8	23.3	45.1
Main minor	4.4	3.4	0.6	0.9
Tributary minor	0.0	0.0	20.0	7.0
D & I	7.8	7.9	1.0	2.1
Maintenance flow	6.8	6.9	1.0	1.9
Sub-total	185.0	185.0	46.0	57.0
Muda-Perai System				
Kedah				
Main minor			1.5	0.2
Tributary minor			10.0	1.0
D & I			2.0	2.0
Pulau Pinang				
Main minor			1.5	0.8
D & I			5.0	5.0
Sub-total			20.0	9.0
Total	185.0	185.0	66.0	66.0

Table 89 NET WATER OUTPUT OF SOURCE FACILITIES
BY CAUSE OF WATER DEFICIT
(ALTERNATIVE 3, KEDAH PRIORITY) (3/6)

Unit: 10⁶ m³

Cause of Water Deficit	Jeniang System		Beris	
	Case A	Case B	Case A	Case B
<u>1990</u>				
Kedah System				
MADA	178.4	178.3	53.9	53.9
Main minor	3.6	3.6	1.1	1.1
Tributary minor			7.0	7.0
D & I			0.0	
Sub-total	182.0	182.0	62.0	62.0
Muda-Perai System				
Kedah				
Main minor				
Tributary minor				
D & I				
Pulau Pinang				
Main minor				
D & I				
Sub-total			0.0	0.0
Total	182.0	182.0	62.0	62.0
<u>2000</u>				
Kedah System				
MADA	167.8	168.7	41.3	53.2
Main minor	4.4	3.5	1.1	1.1
Tributary minor	0.0	0.0	20.0	7.0
D & I	7.9	7.9	1.9	2.5
Maintenance flow	6.9	6.9	1.7	2.2
Sub-total	187.0	187.0	66.0	66.0
Muda-Perai System				
Kedah				
Main minor				
Tributary minor				
D & I				
Pulau Pinang				
Main minor				
D & I				
Sub-total			0.0	0.0
Total	187.0	187.0	66.0	66.0

Table 90 NET WATER OUTPUT OF SOURCE FACILITIES
BY CAUSE OF WATER DEFICIT
(ALTERNATIVE 1, MUDA PRIORITY) (4/6)

Unit: 10^6 m^3

Cause of Water Deficit	Reman		Tawar-Muda		Khleng Thepha		Merbok	
	Case A	Case B	Case A	Case B	Case A	Case B	Case A	Case B
<u>1990</u>								
Kedah System								
MADA	87.2	87.2	18.6	18.6	42.1	42.1		
Main minor	1.8	1.8	0.4	0.4	0.9	0.9		
Tributary minor D & I								
Sub-total	89.0	89.0	19.0	19.0	43.0	43.0	0.0	0.0
Muda-Perai System								
Kedah								
Main minor								
Tributary minor D & I								
Pulau Pinang								
Main minor D & I								
Sub-total								
Total	89.0	89.0	19.0	19.0	43.0	43.0	0.0	0.0
<u>2000</u>								
Kedah System								
MADA	87.0	87.4	20.6	20.7	38.6	38.8		
Main minor	2.3	1.8	0.5	0.4	1.0	0.8		
Tributary minor D & I	4.1	4.1	1.0	1.0	1.8	1.8		
Maintenance flow	3.6	3.6	0.9	0.9	1.6	1.6		
Sub-total	97.0	97.0	23.0	23.0	43.0	43.0	0.0	0.0
Muda-Perai System								
Kedah								
Main minor								
Tributary minor D & I								
Pulau Pinang								
Main minor D & I								
Sub-total								
Total	97.0	97.0	23.0	23.0	43.0	43.0	0.0	0.0

Table 91 NET WATER OUTPUT OF SOURCE FACILITIES
 BY CAUSE OF WATER DEFICIT
 (ALTERNATIVE 2, EVEN DISTRIBUTION) (5/6)

Unit: 10^6 m^3

Cause of Water Deficit	Reman		Merbok	
	Case A	Case B	Case A	Case B
<u>1990</u>				
Kedah System				
MADA	87.2	81.3		
Main minor	1.8	1.7		
Tributary minor				
D & I				
Sub-total	89.0	83.0		
Muda-Perai System				
Kedah				
Main minor				
Tributary minor				
D & I				
Pulau Pinang				
Main minor				
D & I				
Sub-total				
Total	89.0	83.0		
<u>2000</u>				
Kedah System				
MADA	74.4	74.8		
Main minor	2.6	1.6		
Tributary minor				
D & I	3.5	3.5		
Maintenance flow	3.1	3.1		
Sub-total	83.0	83.0		
Muda-Perai System				
Kedah				
Main minor				
Tributary minor				
D & I				
Pulau Pinang				
Main minor				
D & I				
Sub-total				
Total	83.0	83.0		

Table 92 NET WATER OUTPUT OF SOURCE FACILITIES
BY CAUSE OF WATER DEFICIT
(ALTERNATIVE 3, KEDAH PRIORITY) (6/6)

Unit: 10⁶ m³

Cause of Water Deficit	Reman		Tawar-Muda		Khlong Thepha		Merbok	
	Case A	Case B	Case A	Case B	Case A	Case B	Case A	Case B
<u>1990</u>								
Kedah System								
MADA	81.3	81.3	16.7	16.7	42.1	42.1		
Main minor	1.7	1.7	0.3	0.3	0.9	0.9		
Tributary minor D & I								
Sub-total	83.0	83.0	17.0	17.0	43.0	43.0		
Muda-Perai System								
Kedah								
Main minor							3.0	1.0
Tributary minor D & I							4.0	1.0
							2.0	2.0
Pulau Pinang								
Main minor D & I							3.0	3.0
							0.0	0.0
Sub-total							12.0	7.0
Total	83.0	83.0	17.0	17.0	43.0	43.0	12.0	7.0
<u>2000</u>								
Kedah System								
MADA	74.4	74.8	17.0	17.1	32.3	32.5		
Main minor	2.0	1.6	0.5	0.4	0.9	0.7		
Tributary minor D & I	3.5	3.5	0.8	0.8	1.5	1.5		
Maintenance flow	3.1	3.1	0.7	0.7	1.3	1.3		
Sub-total	83.0	83.0	19.0	19.0	36.0	36.0		
Muda-Perai System								
Kedah								
Main minor							3.0	1.0
Tributary minor D & I							10.0	1.0
							2.0	2.0
Pulau Pinang								
Main minor D & I							3.0	3.0
							5.0	5.0
Sub-total							23.0	12.0
Total	83.0	83.0	19.0	19.0	36.0	36.0	23.0	12.0

FIGURES

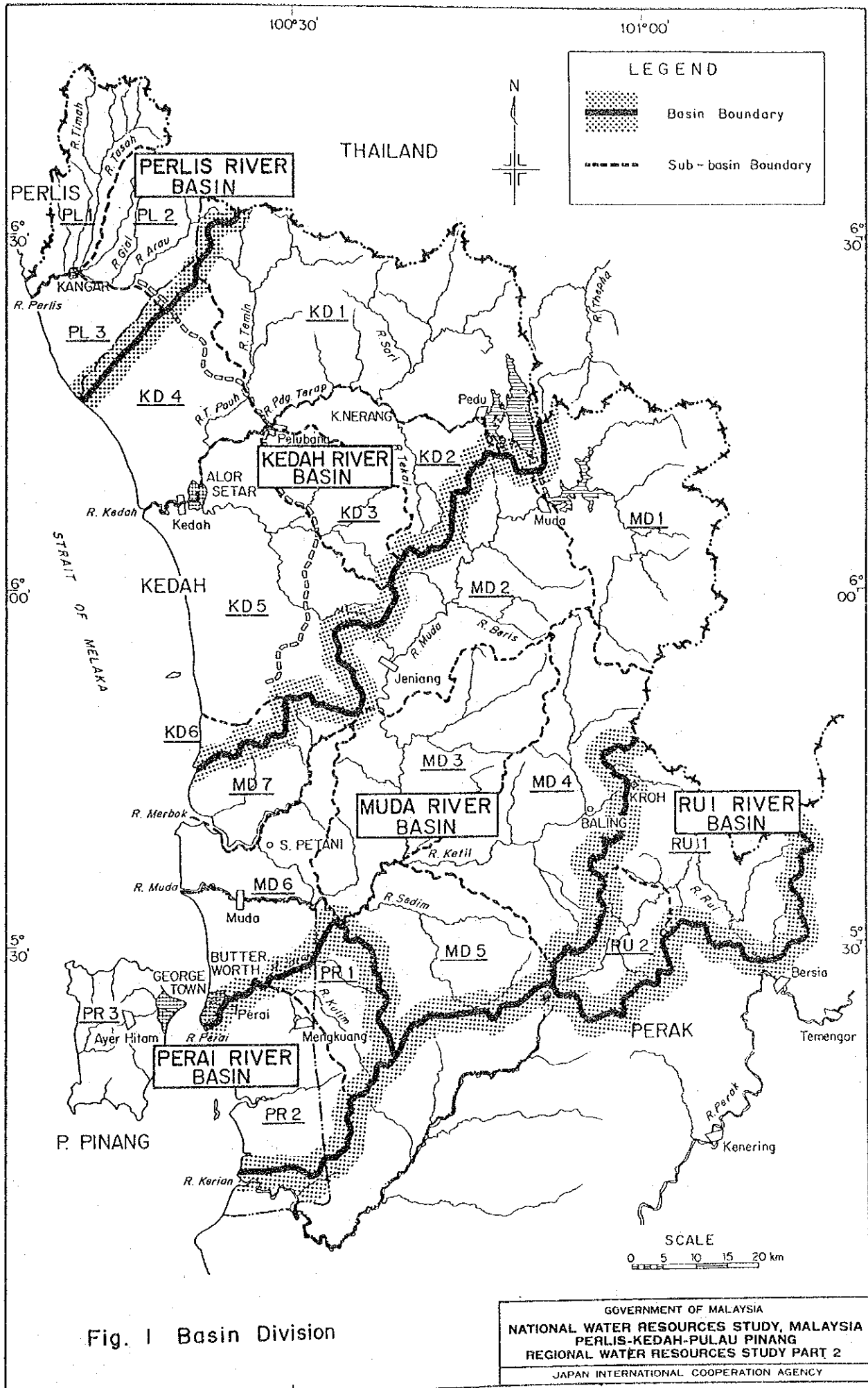


Fig. 1 Basin Division

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 PERLIS-KEDAH-PULAU PINANG
 REGIONAL WATER RESOURCES STUDY PART 2
 JAPAN INTERNATIONAL COOPERATION AGENCY

$$R_1 = Q_1$$

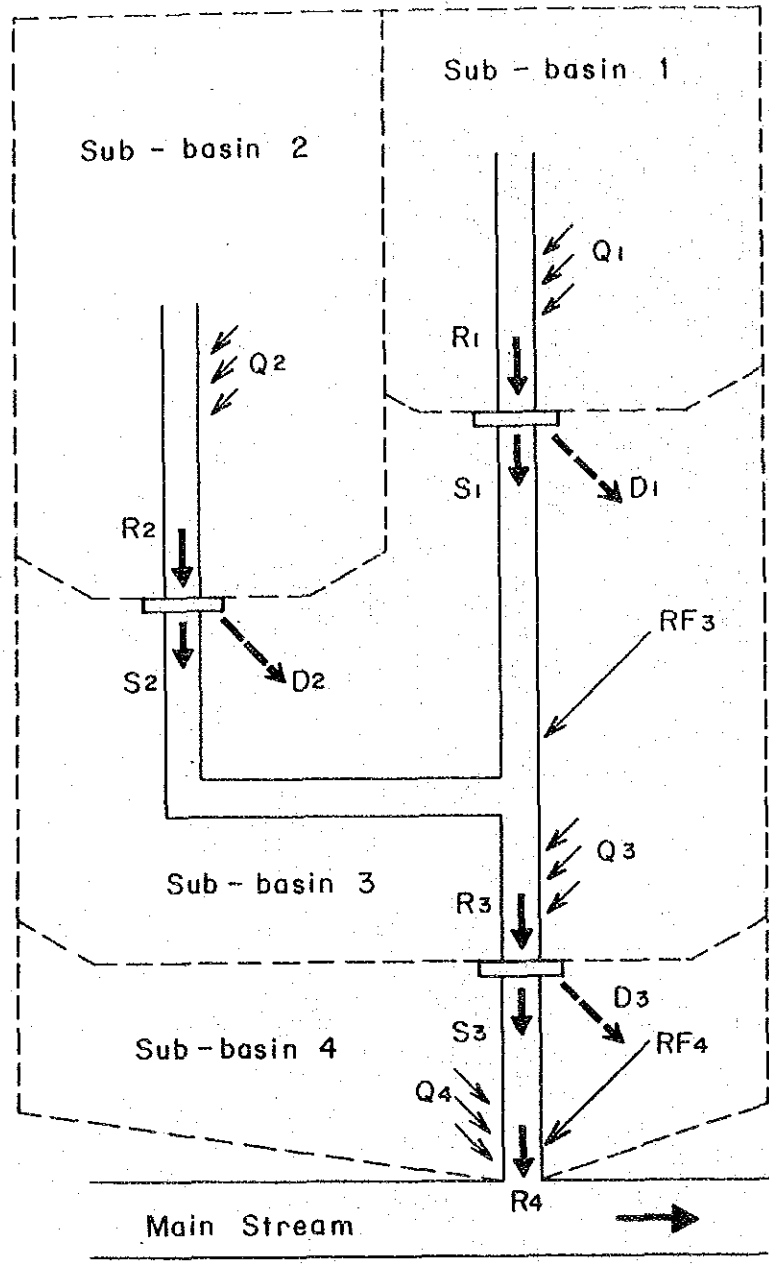
$$R_2 = Q_2$$

$$R_3 = Q_3 + S_1 + S_2 + RF_3$$

$$R_4 = Q_4 + S_3 + RF_4$$

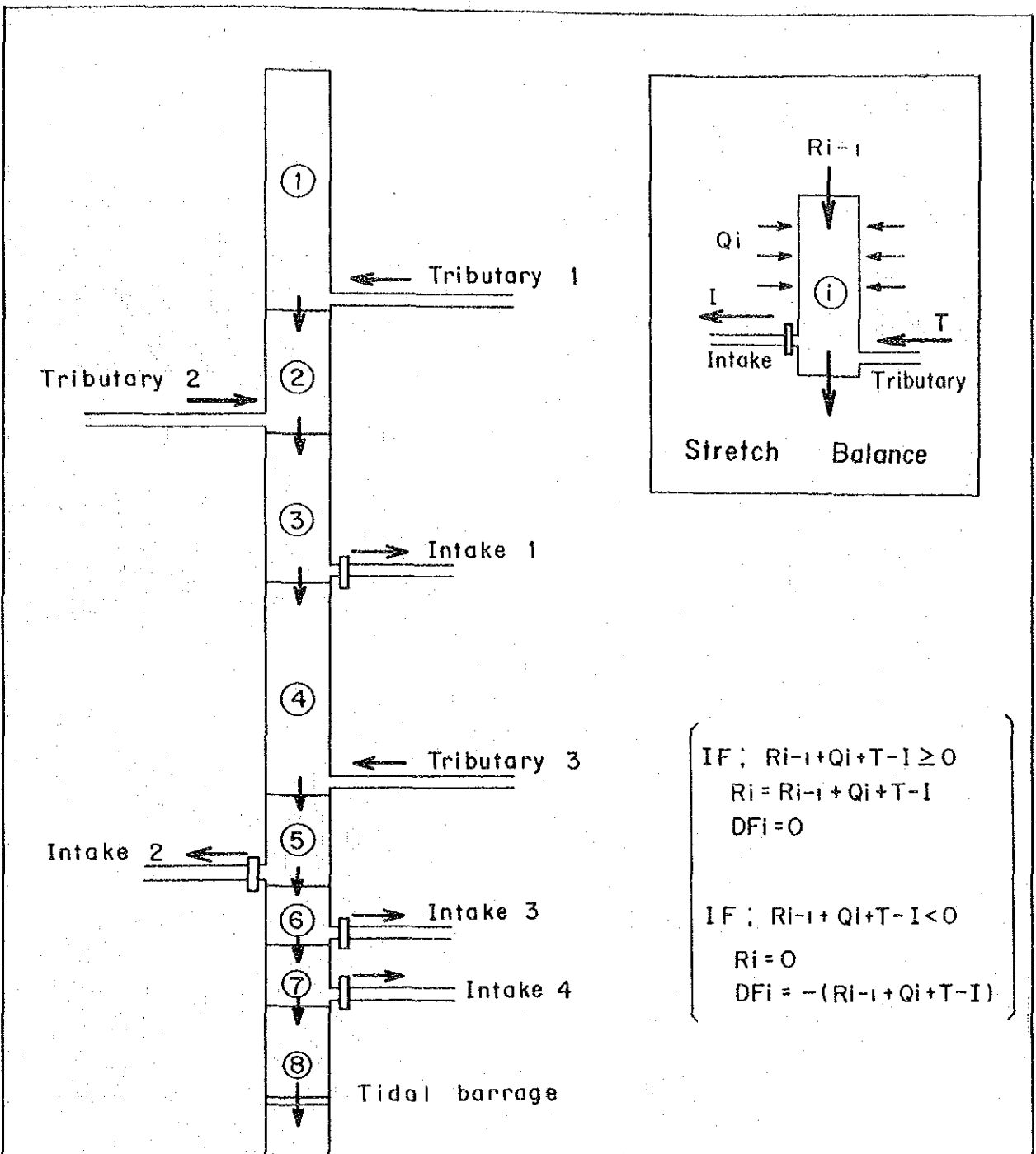
IF ; $R_i > D_i$
 $DF_i = 0$
 $S_i = R_i - D_i$

IF ; $R_i \leq D_i$
 $DF_i = D_i - R_i$
 $S_i = 0$



- R_i Available runoff at intake i ($i = 1 \sim 3$)
- D_i Water demand at "
- S_i Excess runoff at "
- DF_i Water deficit at "
- Q_i Natural runoff in Sub-basin i ($i = 1 \sim 4$)
- RF_i Return flow in "
- R_4 Runoff into the main stream

Fig. 2 Tributary Model



- R_{i-1} Runoff from the upstream stretch
- R_i Surplus runoff to downstream
- Q_i Runoff from catchment of stretch
- DF_i Deficit at stretch i
- T Tributary inflow
- I Intake outflow

Fig. 3 Main Stream Model

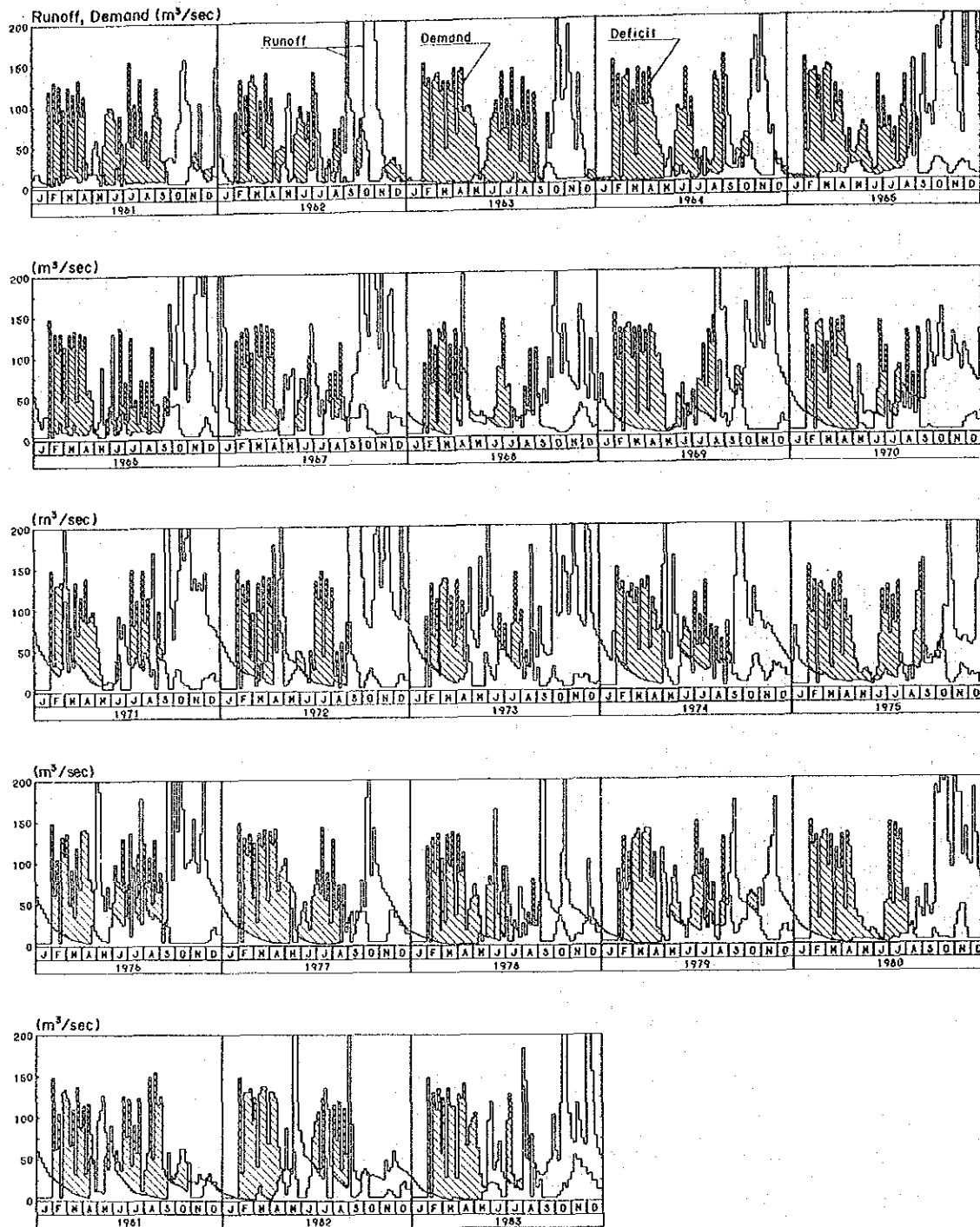


Fig. 4 Water Demand and Supply Balance of Kedah River System in 1983

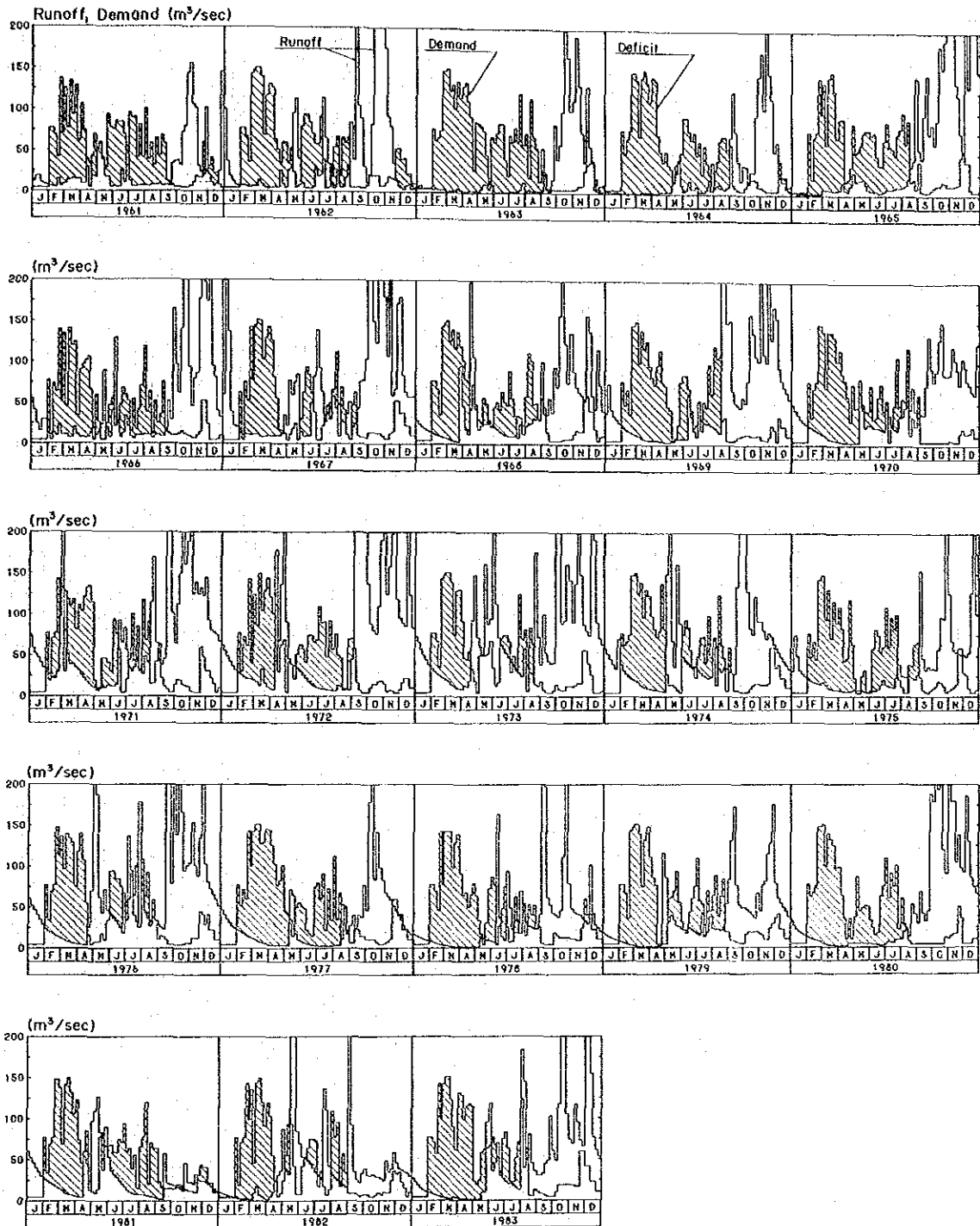


Fig. 5 Water Demand and Supply Balance of Kedah River System in 1990

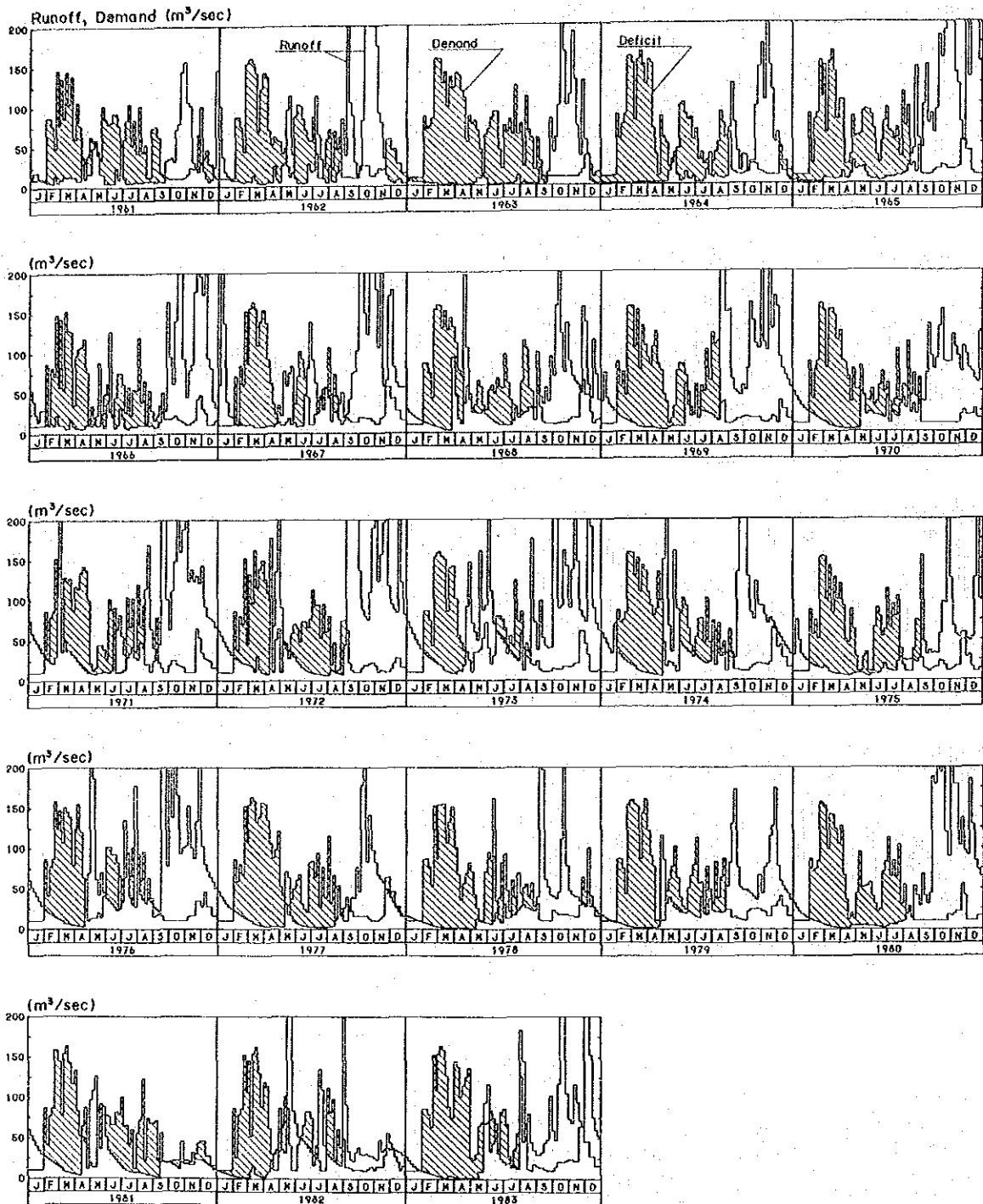


Fig.6 Water Demand and Supply Balance of Kedah River System in 2000

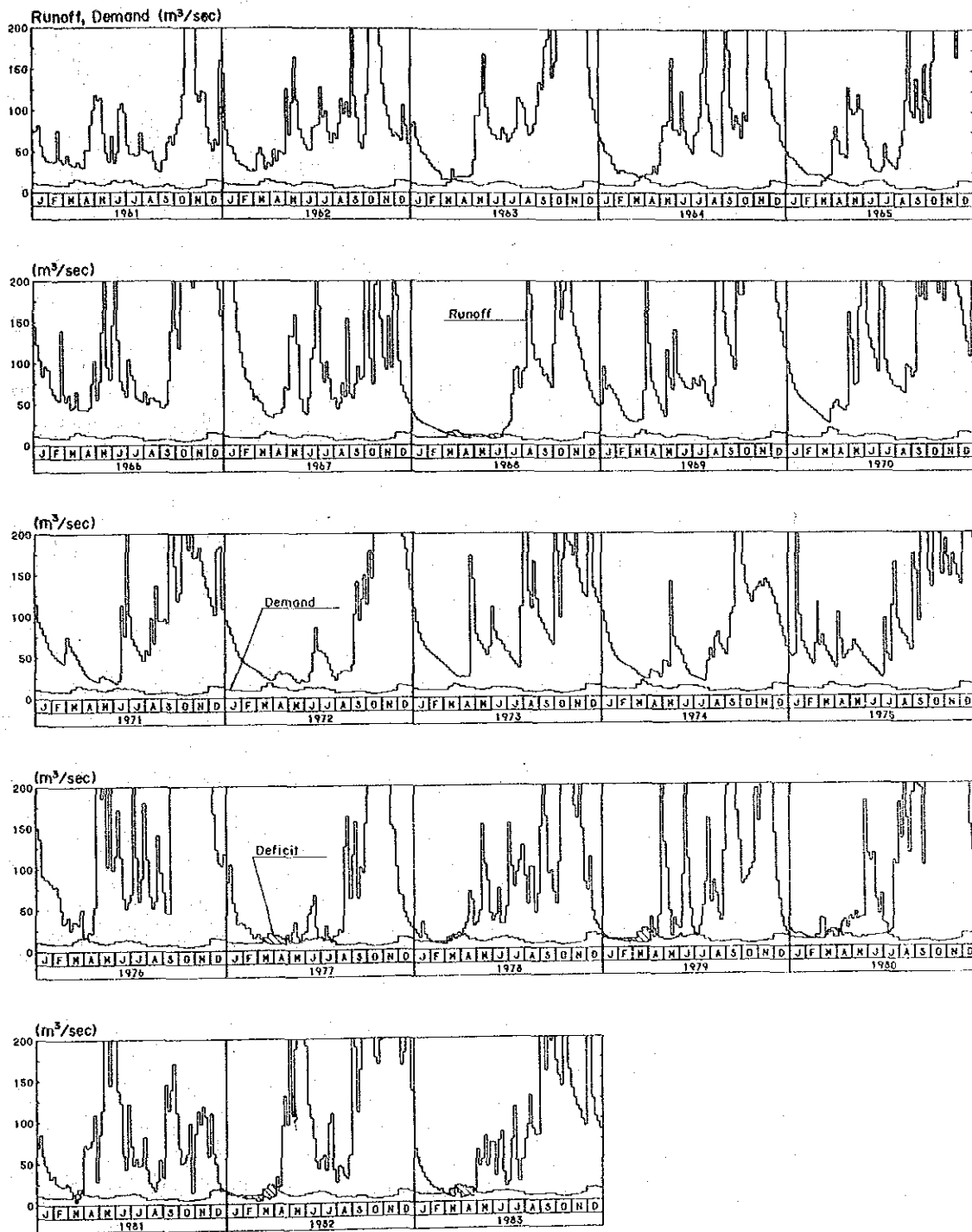


Fig. 7 Water Demand and Supply Balance of Muda River System in 1983

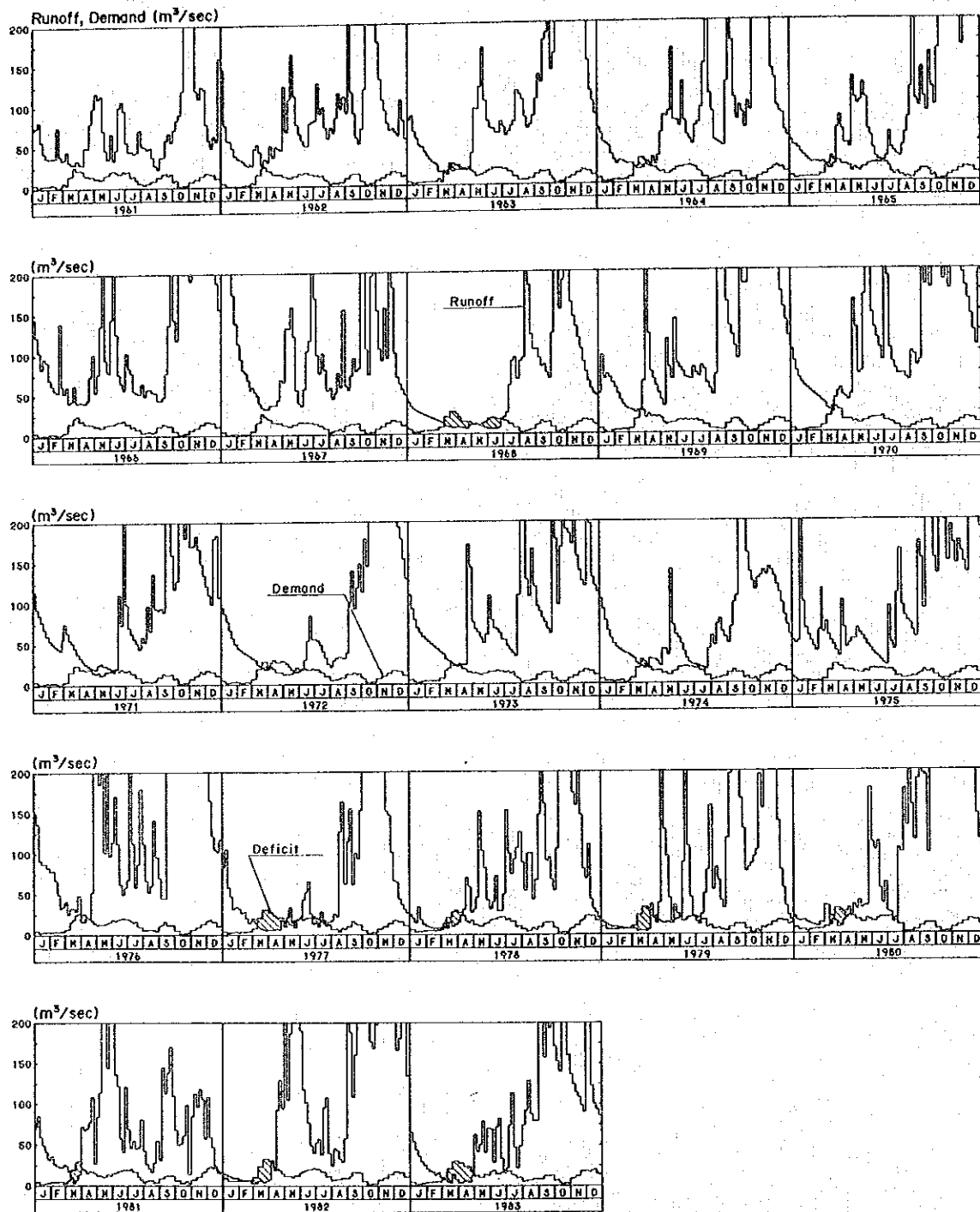


Fig. 8 Water Demand and Supply Balance of Muda River System in 1990

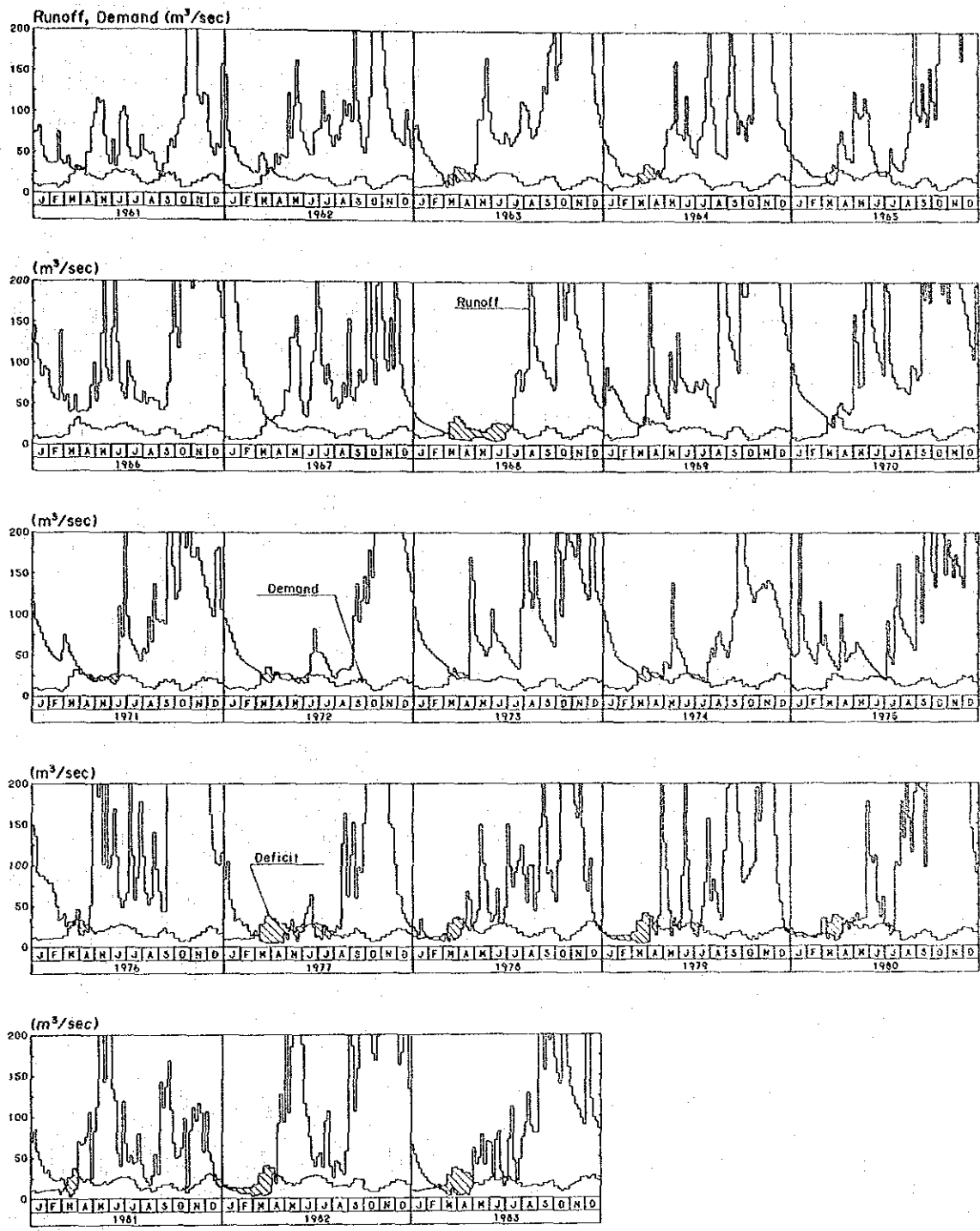


Fig. 9 Water Demand and Supply Balance of Muda River System in 2000

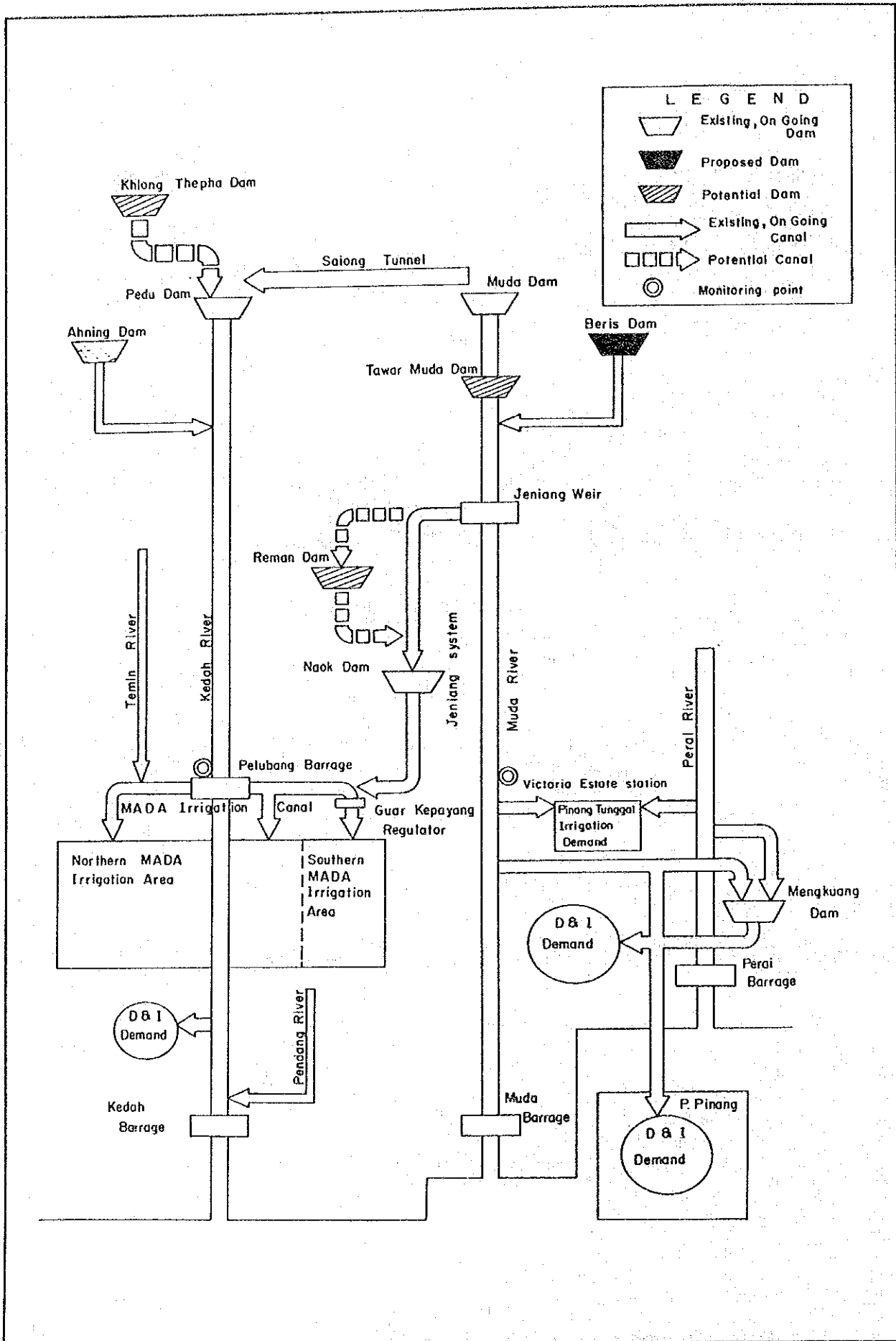


Fig.10 Network of Integrated Operation System

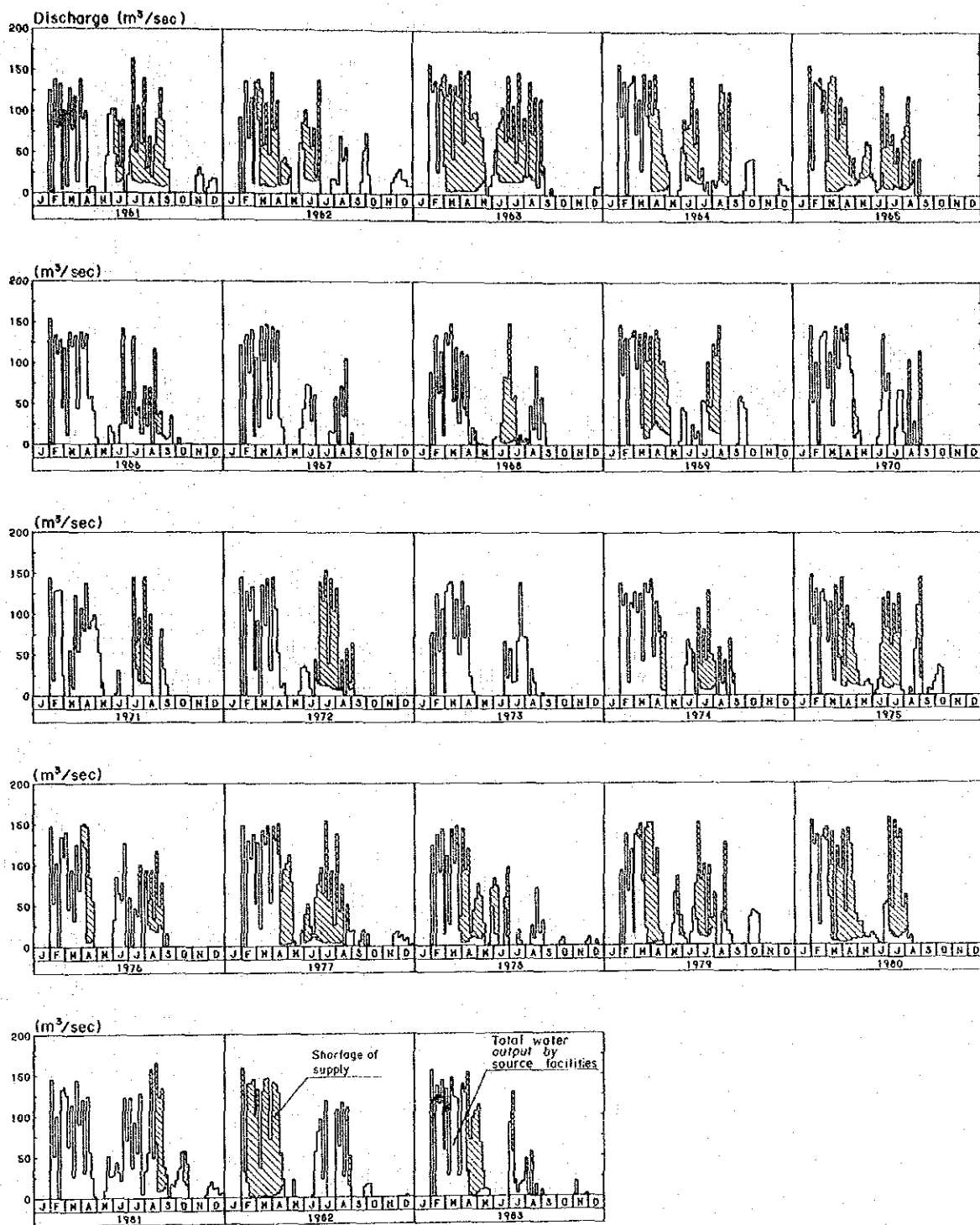


Fig. 11 Water Deficit and Supply Balance of Kedah River with Pedu- Muda in 1983 without Operation Rule

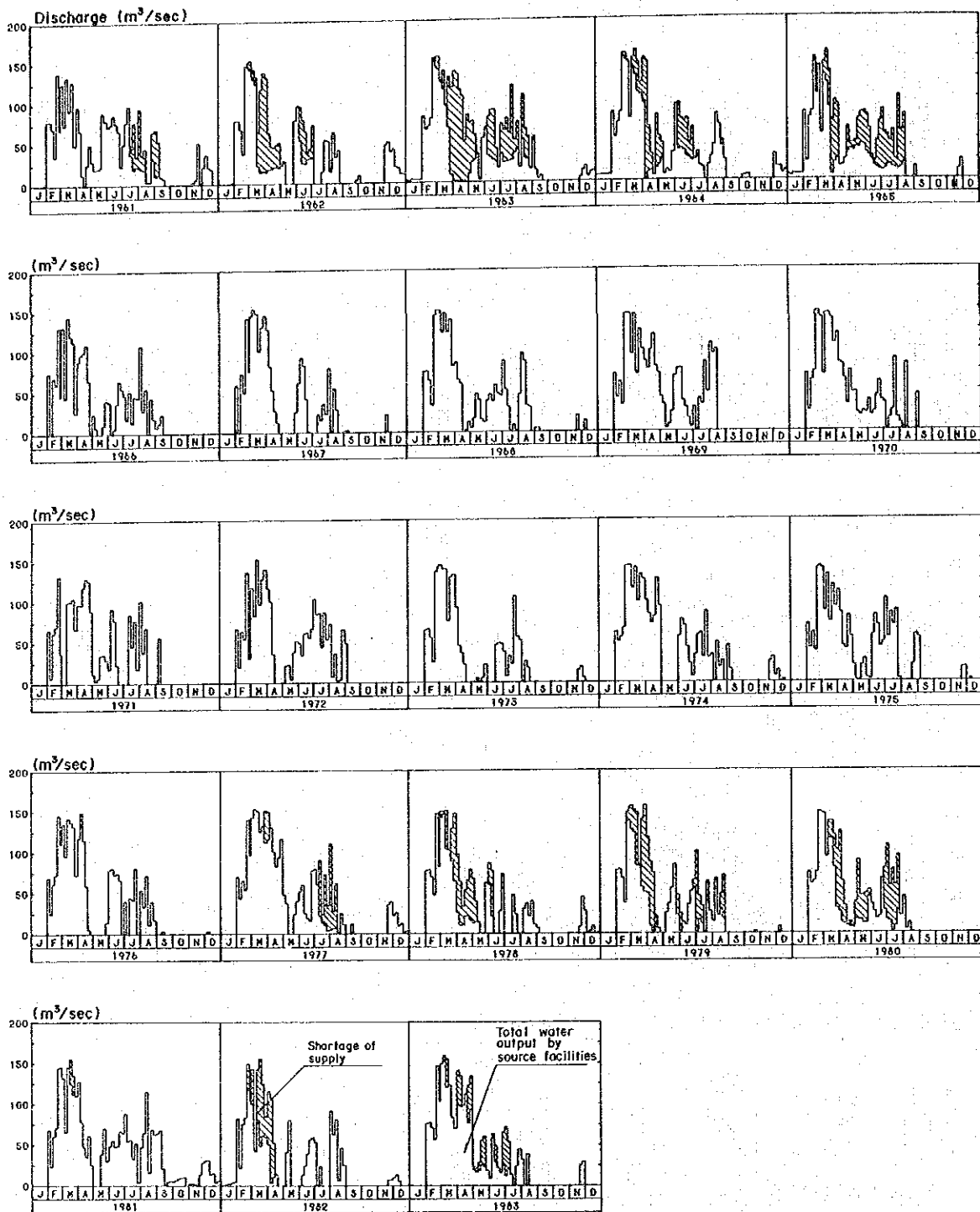


Fig. 12 Water Deficit and Supply Balance of Integrated River System with Pedu-Muda, Ahning, Jeniang, Beris in 2000 without Operation Rule

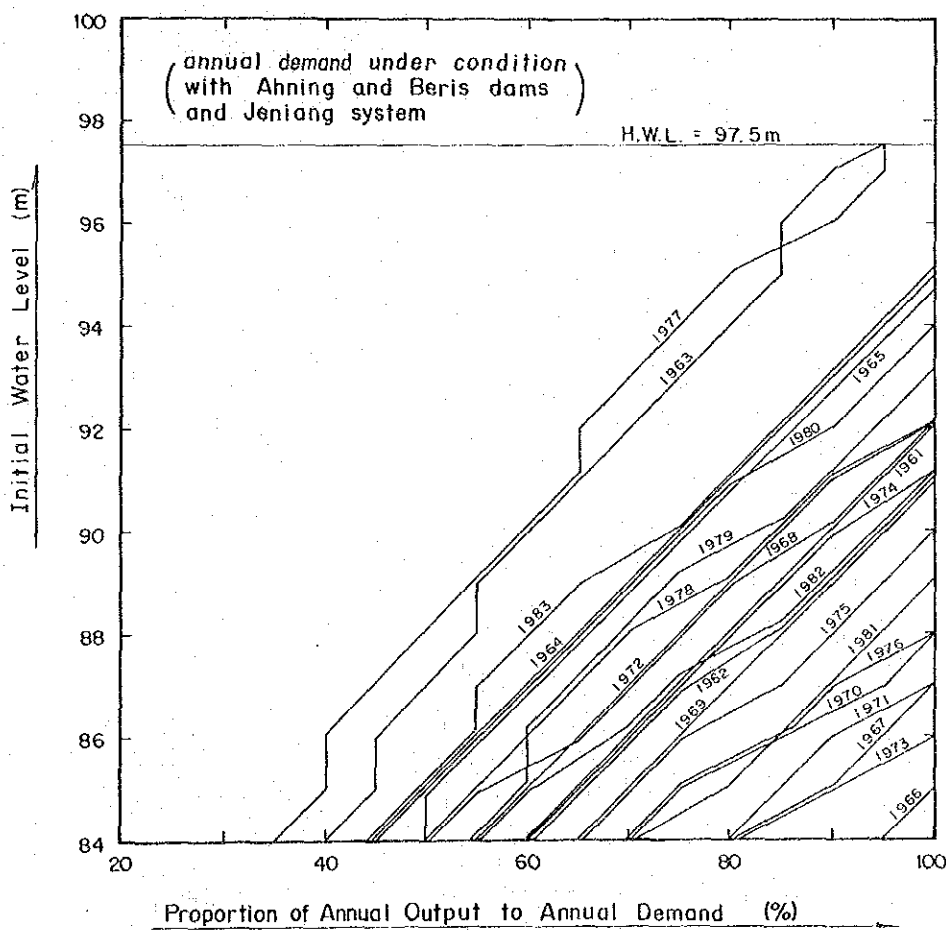
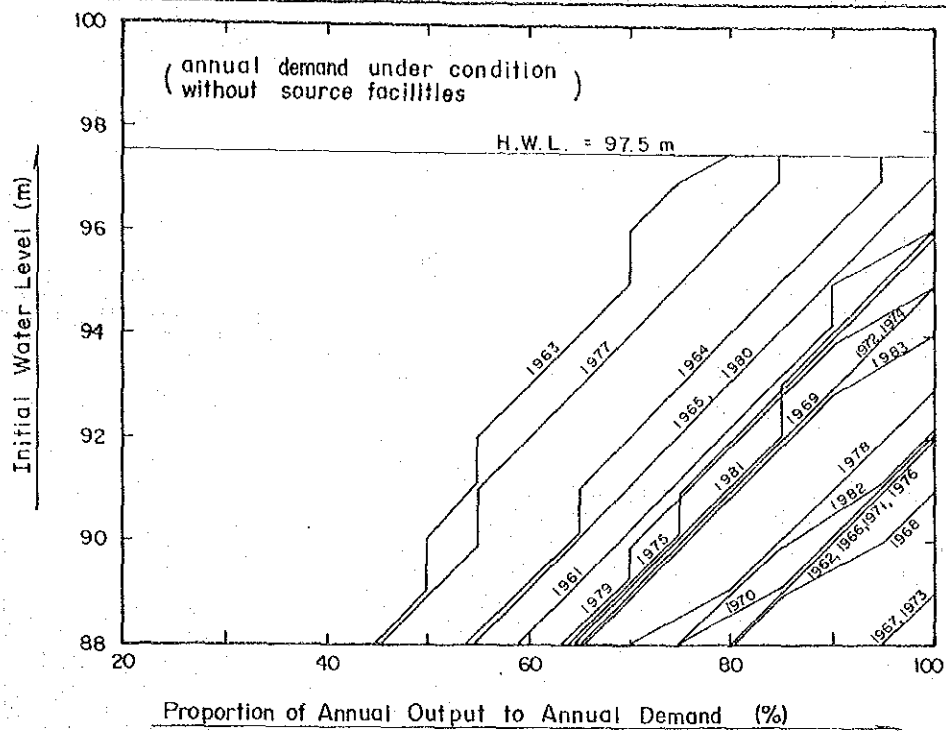


Fig. 13 Relation between Initial Water Level and Annual Output of Pedu Dam for Annual Demand of Kedah River in 2000

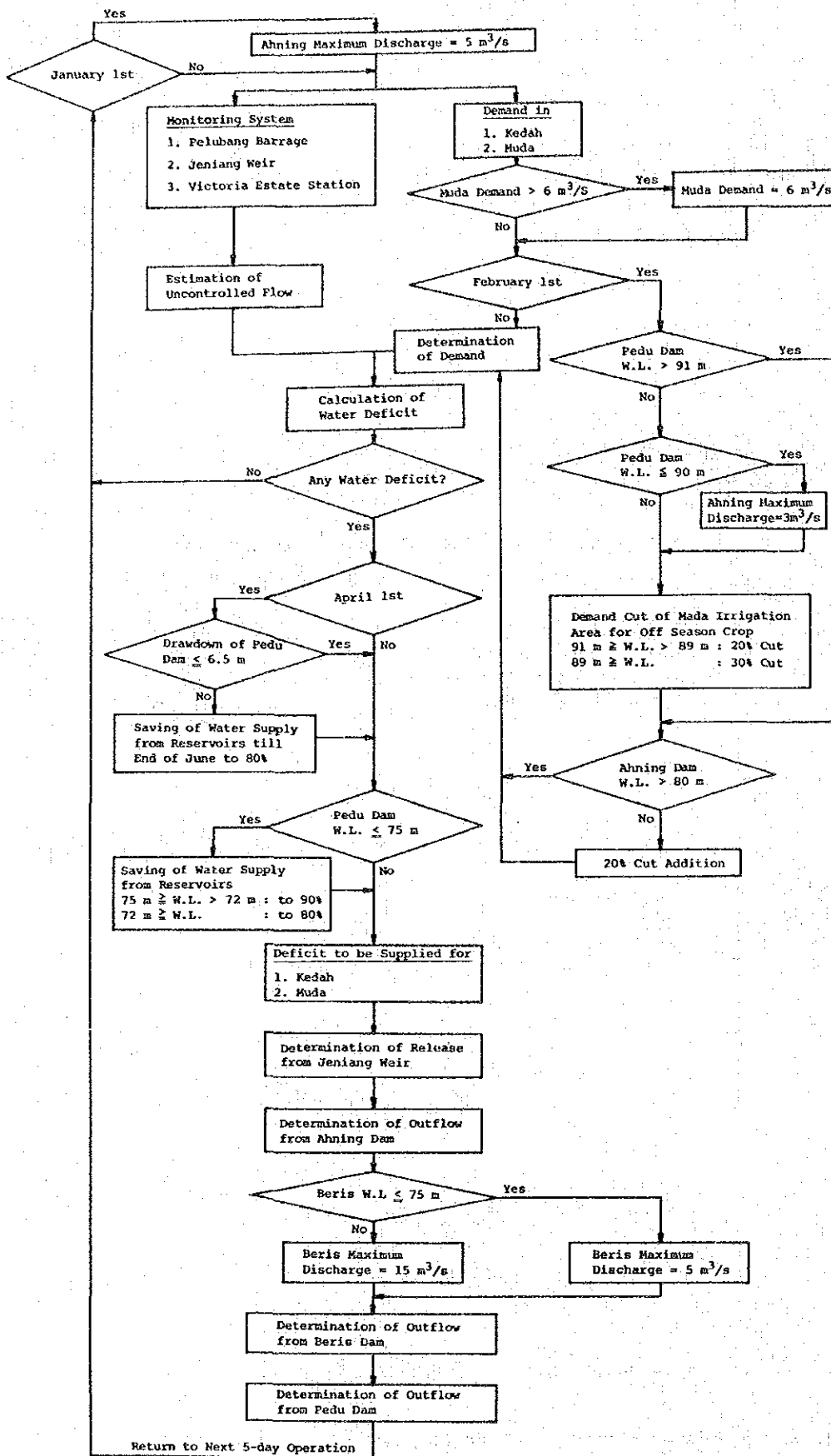


Fig. 14 Proposed Operation Procedure for Combination (d) with Beris Dam

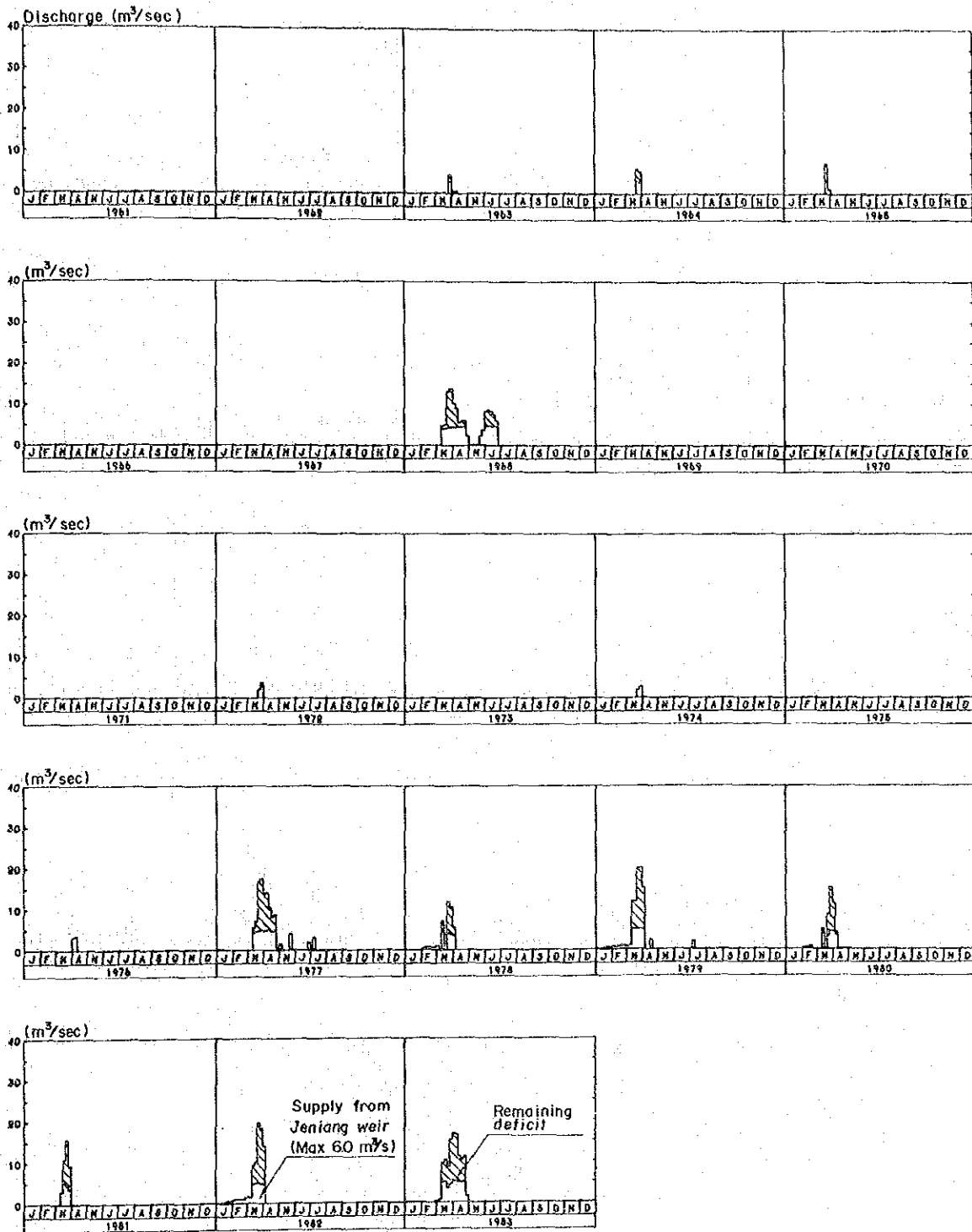


Fig. 15 Remaining Water Deficit of Muda River in 1990 with 6.0 m^3/s of Jeniang Release

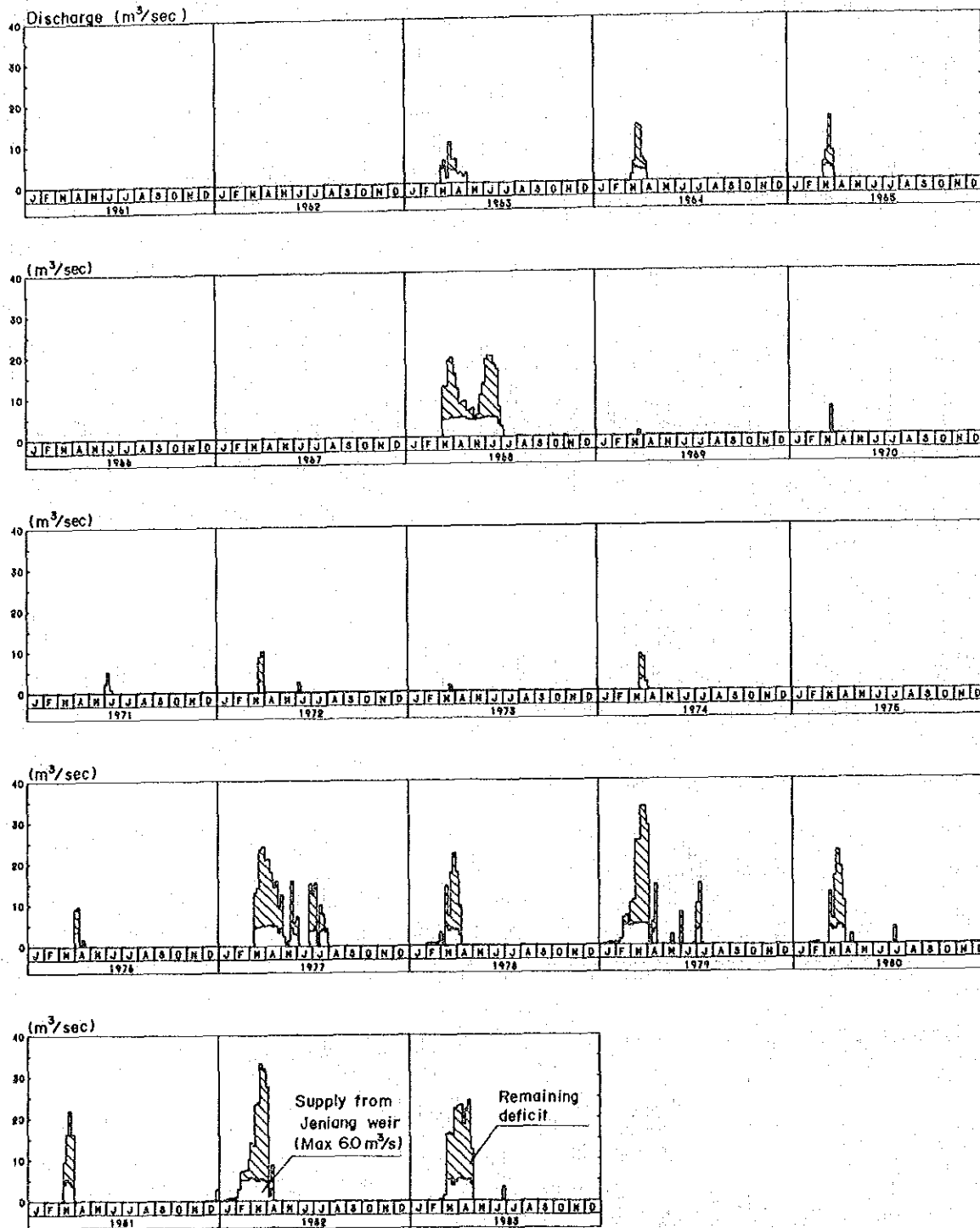


Fig. 16 Remaining Water Deficit of Muda River in 2000 with 6.0 m³/s of Jeniang Release

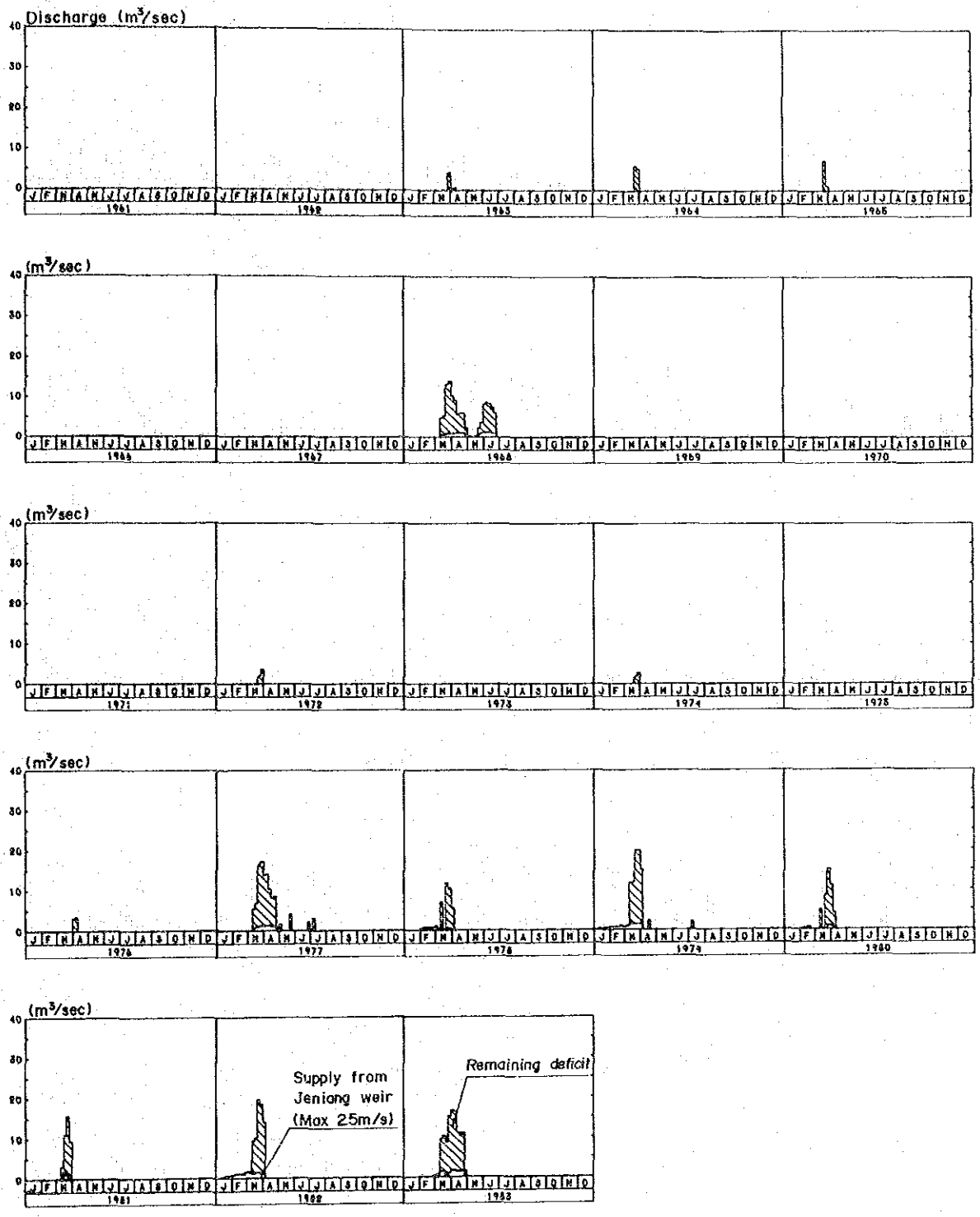


Fig. 17 Remaining Water Deficit of Muda River in 1990 with $2.5 m^3/s$ of Jeniang Release

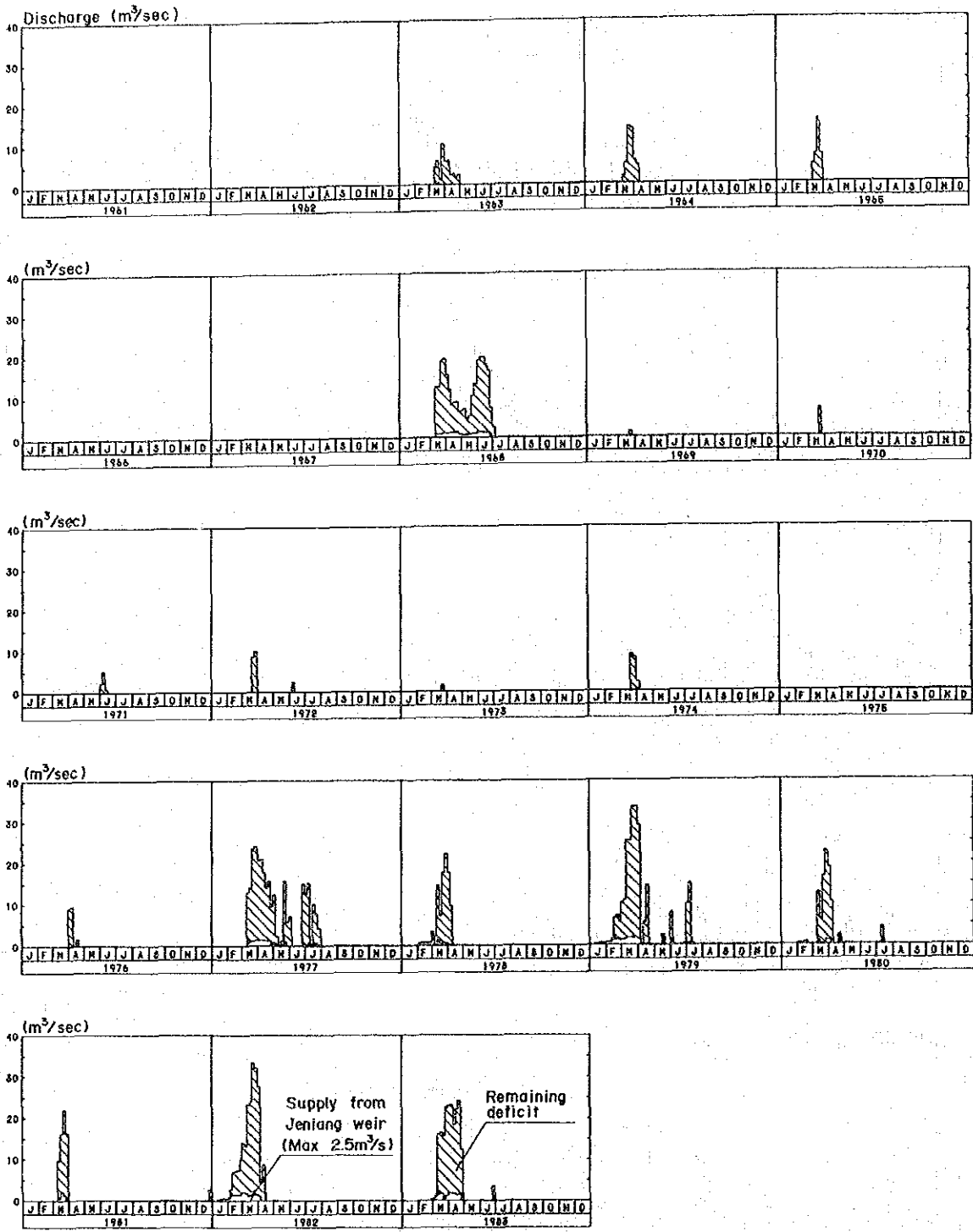


Fig. 18 Remaining Water Deficit of Muda River in 2000 with $2.5m^3/s$ of Jeniang Release

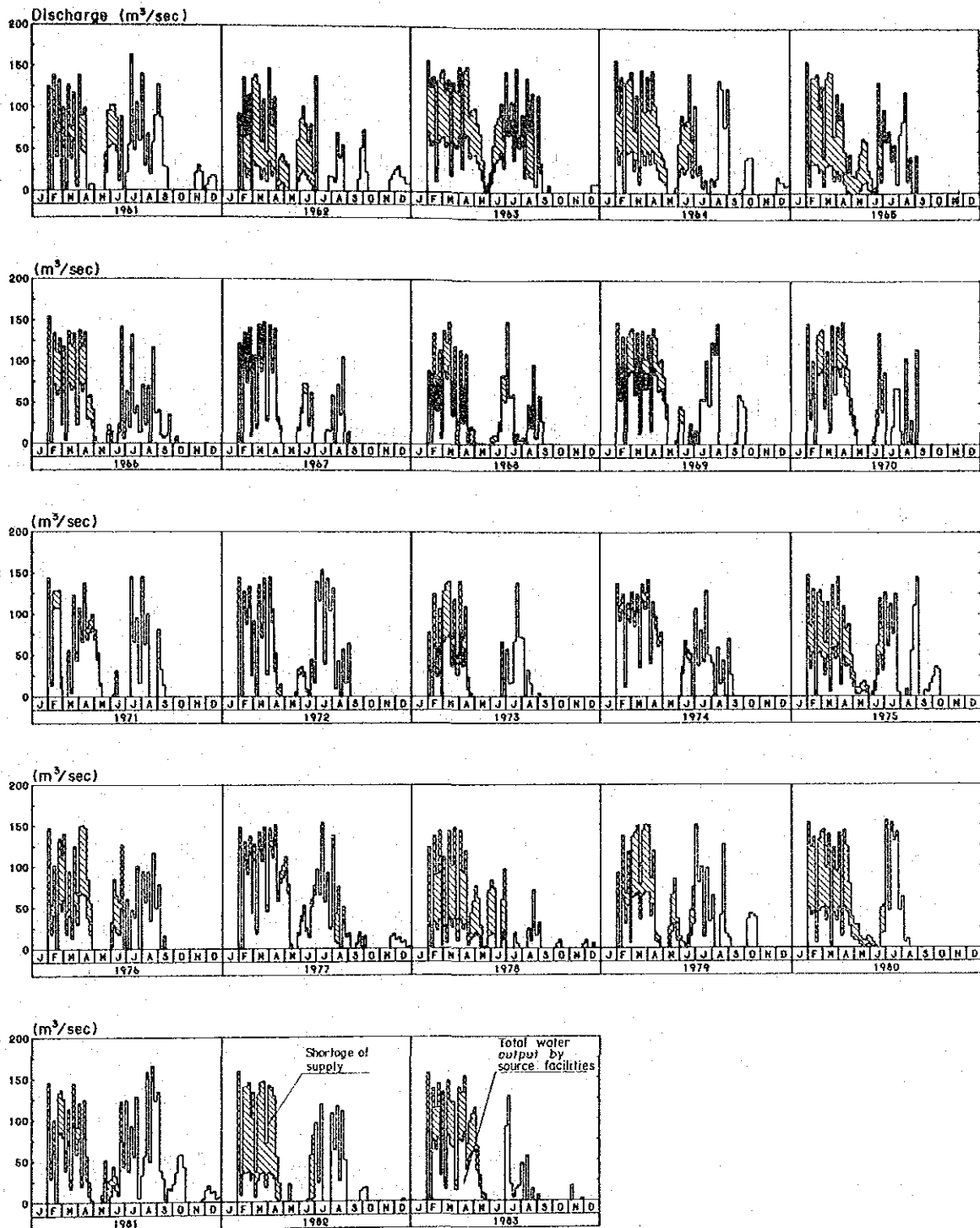


Fig. 19 Water Deficit and Supply Balance of Kedah River with Pedu-Muda in 1983 with Operation Rule

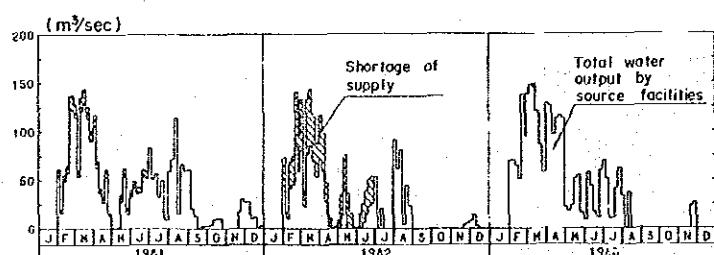
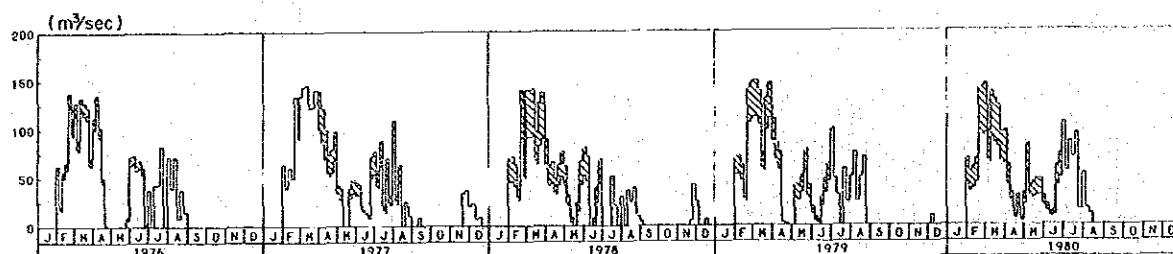
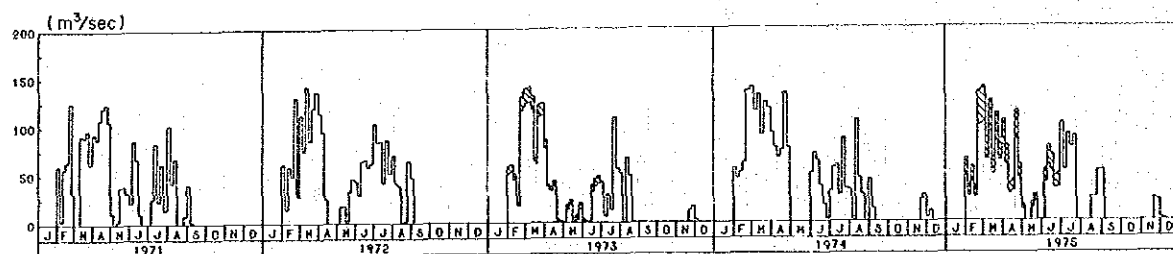
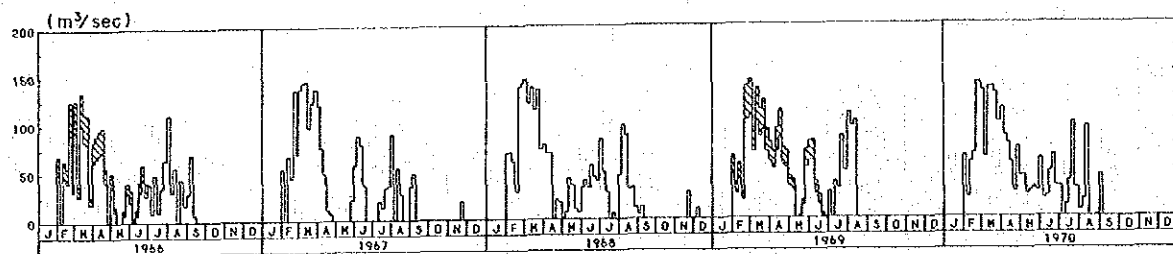
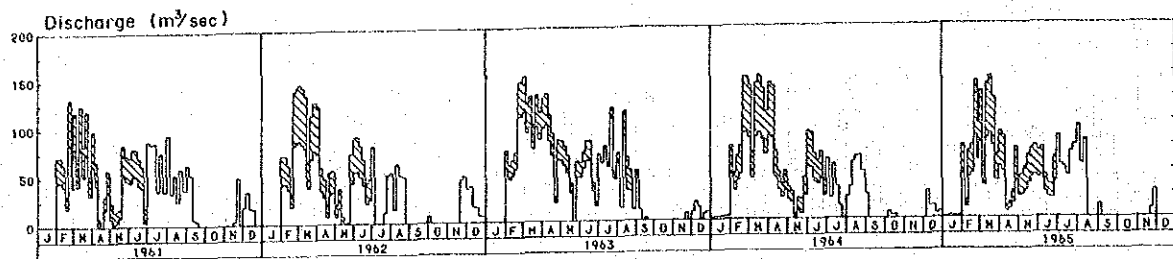


Fig. 20 Water Deficit and Supply Balance of Integrated River System with Pedu-Muda, Ahning, Jeniang in 1990 with Operation Rule

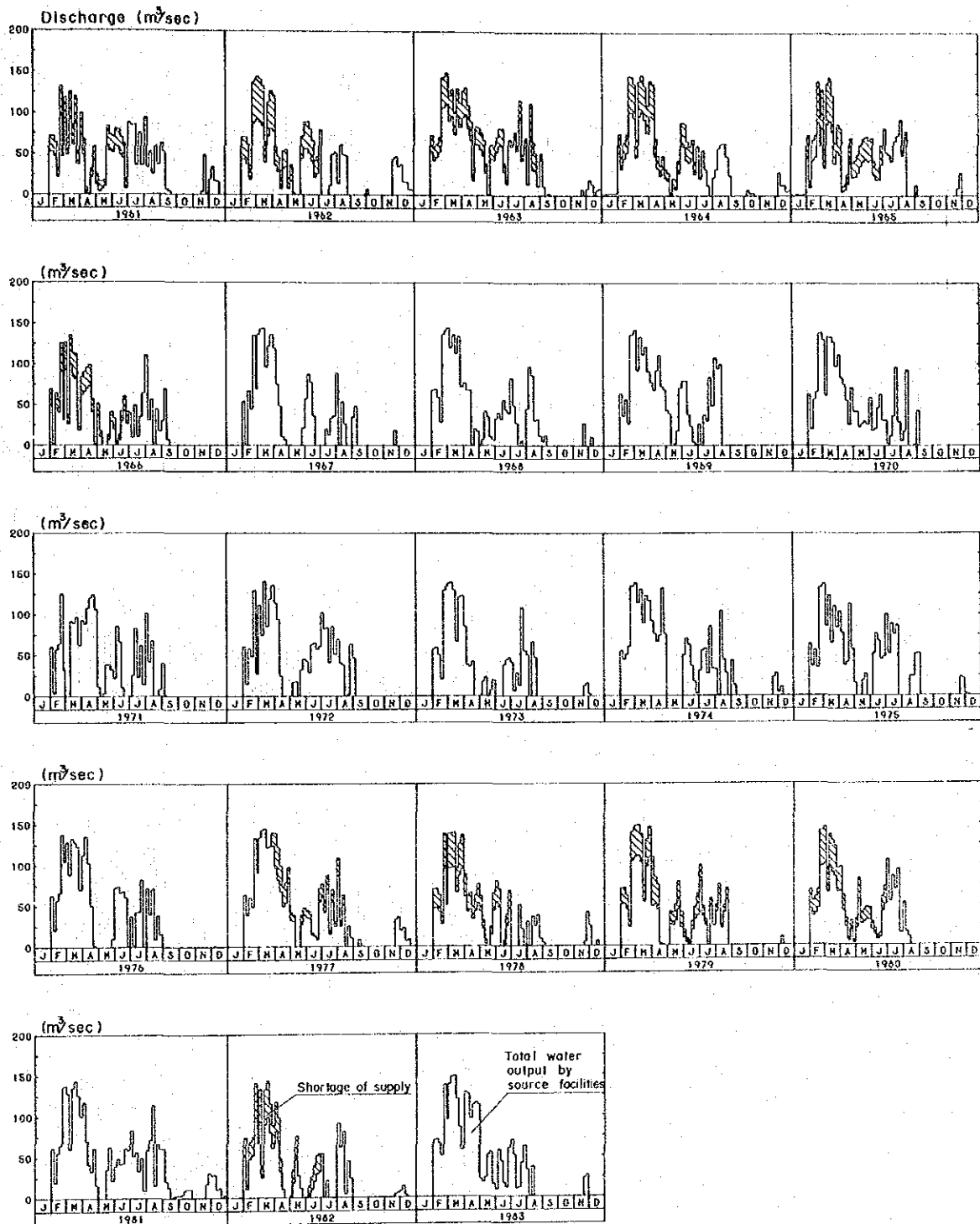


Fig. 21 Water Deficit and Supply Balance of Integrated River System with Pedu-Muda, Ahning, Jeniang, Beris In 1990 with Operation Rule

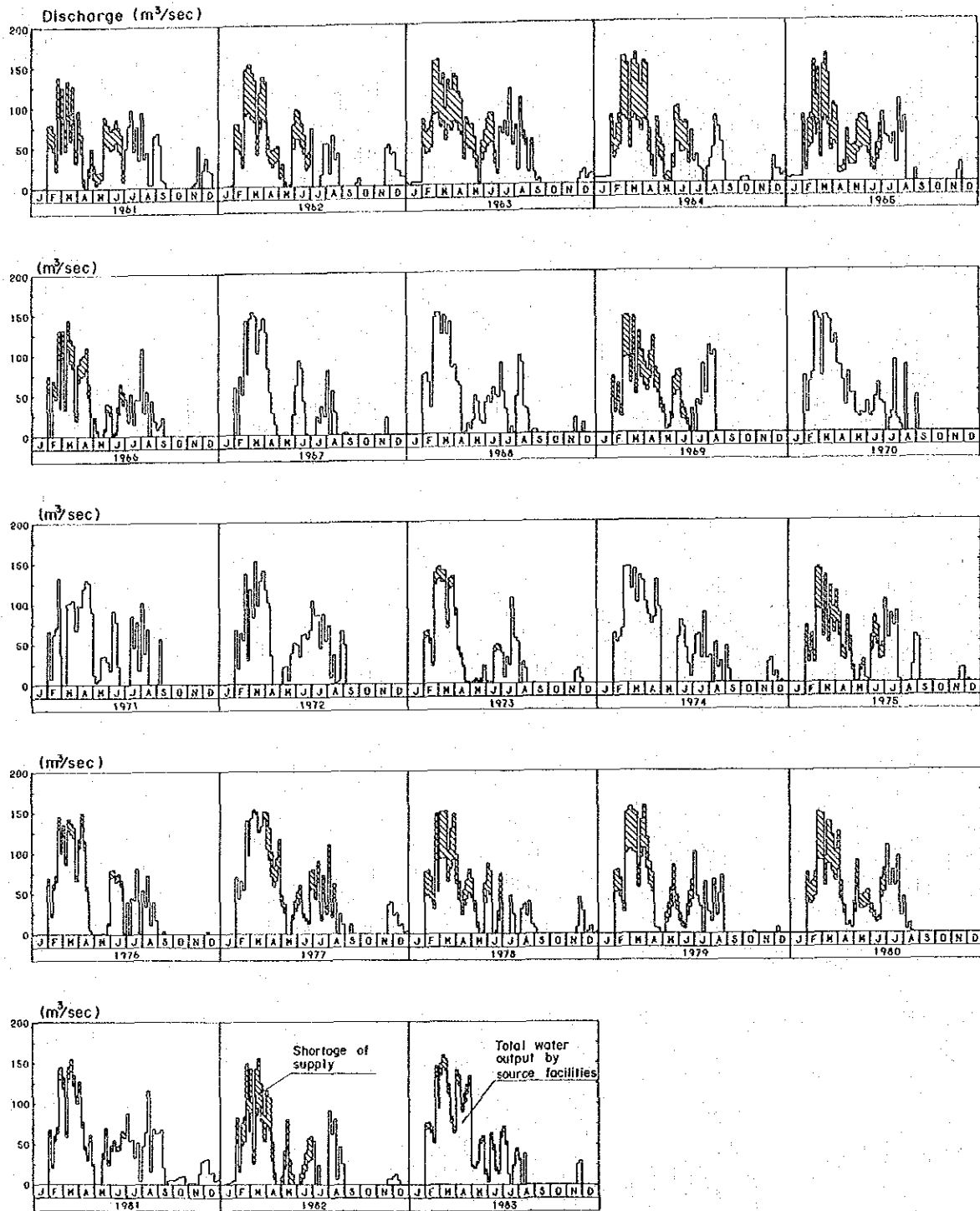


Fig. 22 Water Deficit and Supply Balance of Integrated River System with Pedu-Muda, Ahning, Jeniang in 2000 with Operation Rule

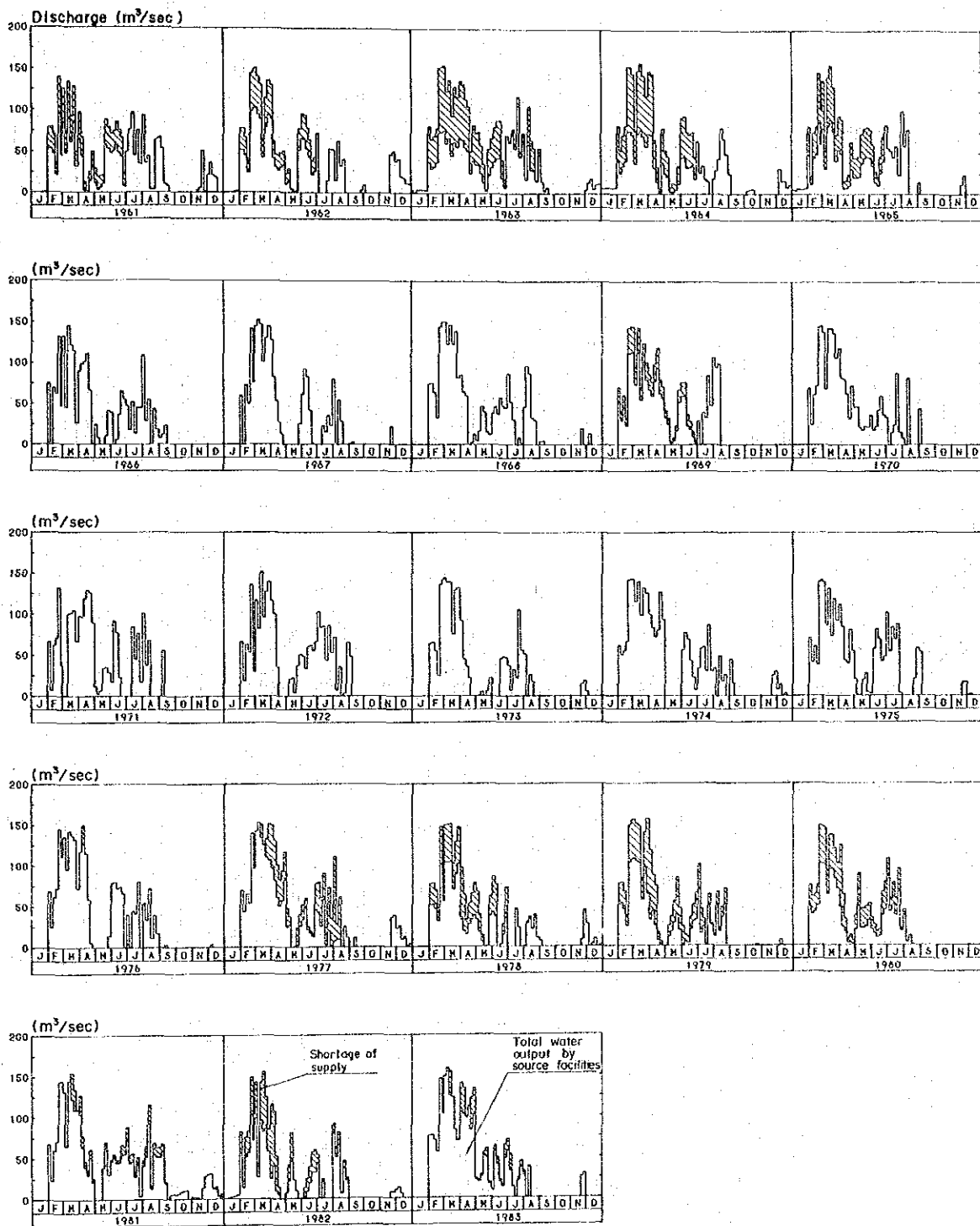


Fig. 23 Water Deficit and Supply Balance of Integrated River System with Pedu-Muda, Ahning, Jeniang, Beris in 2000 with Operation Rule

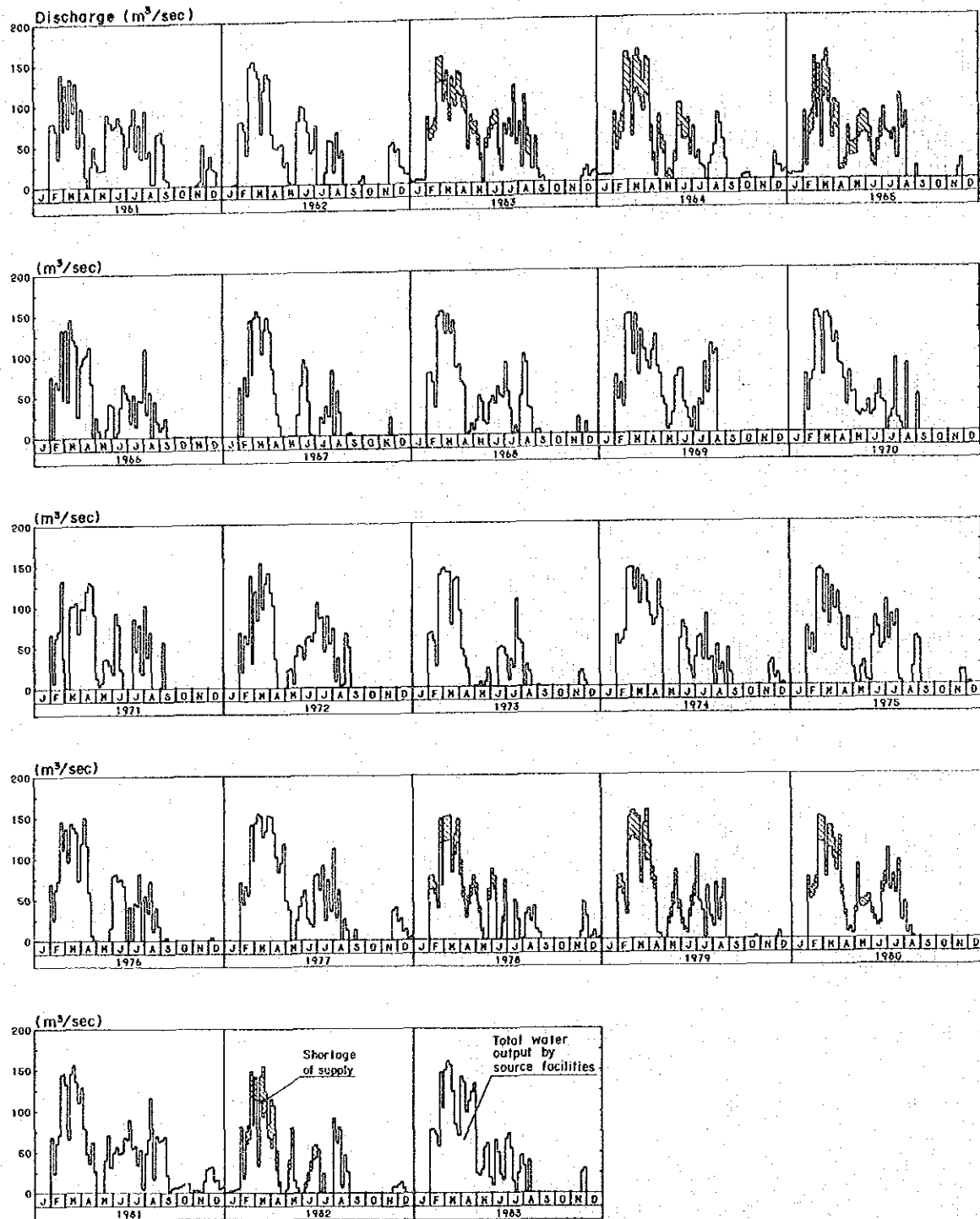


Fig. 24 Water Deficit and Supply Balance of Integrated River System with Pedu-Muda, Ahning, with Operation Rule

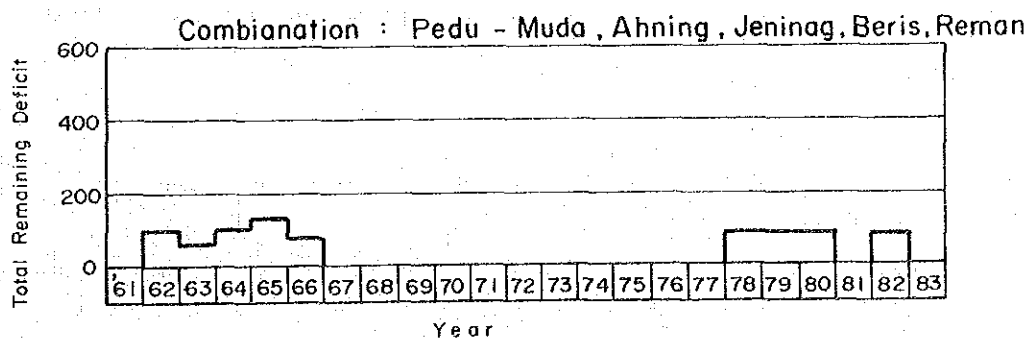
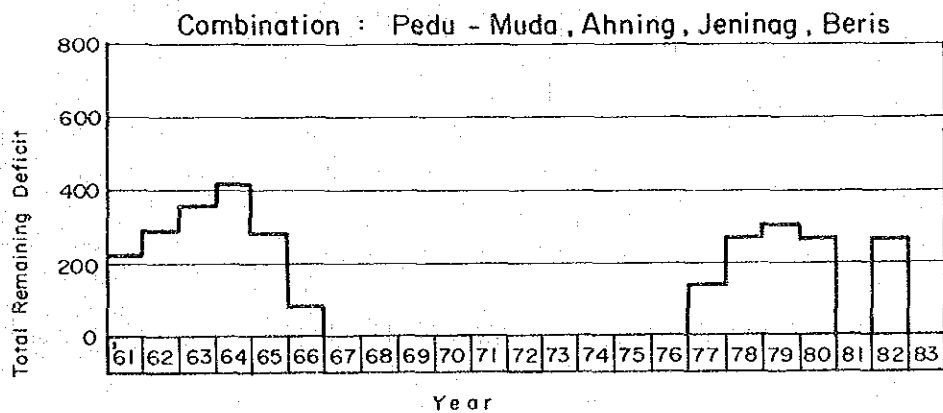
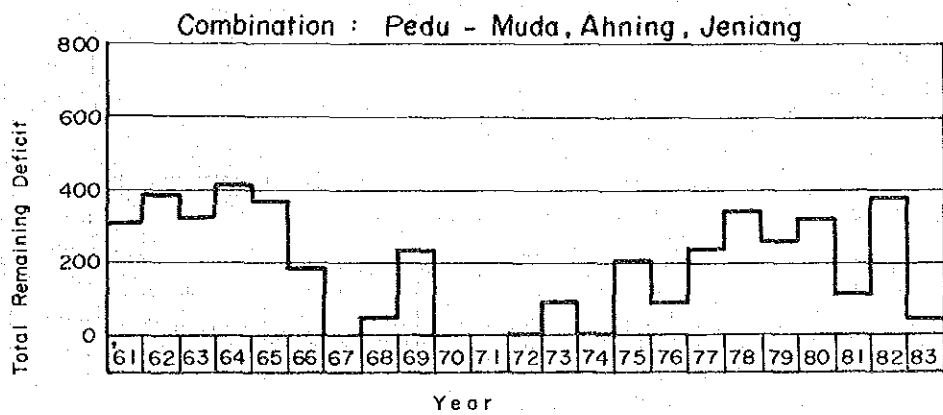
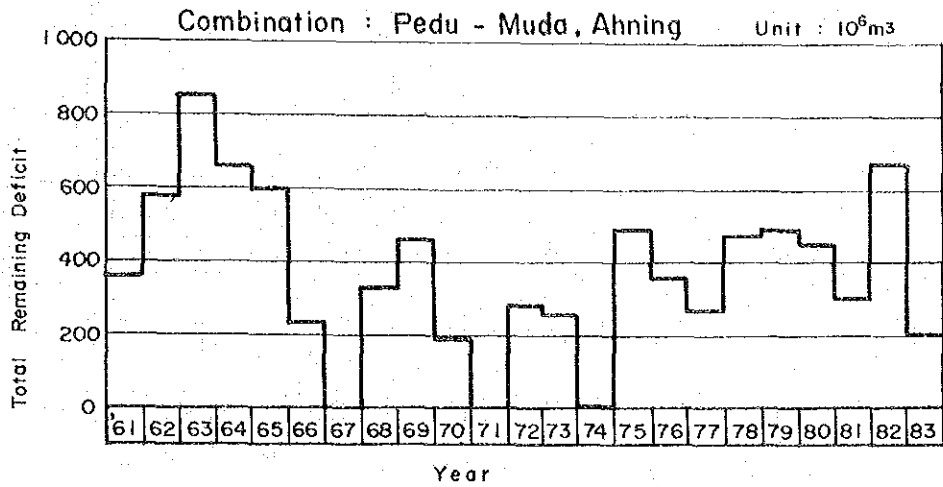


Fig.25 Total Remaining Deficit of Combinations (b) to (e) for 1990 Demand Case I

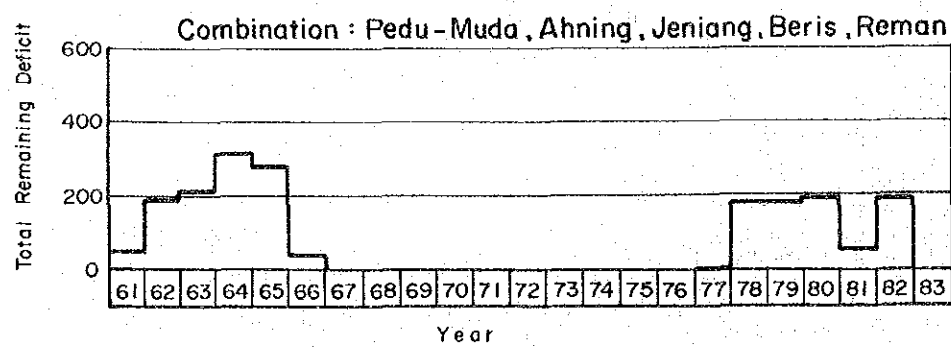
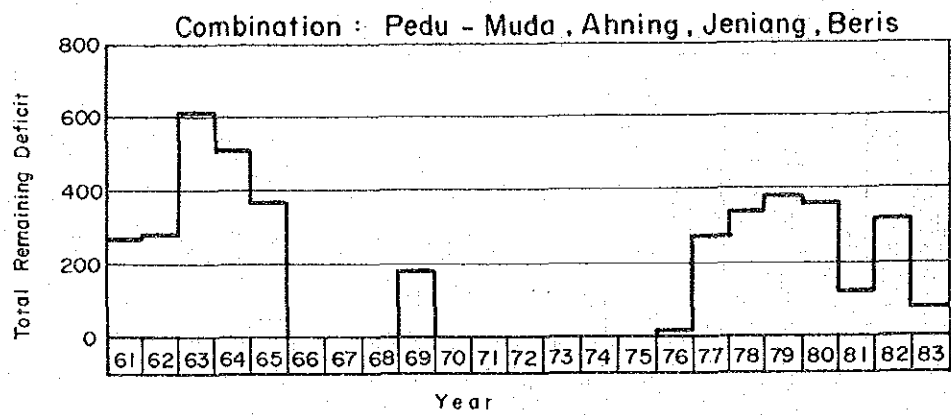
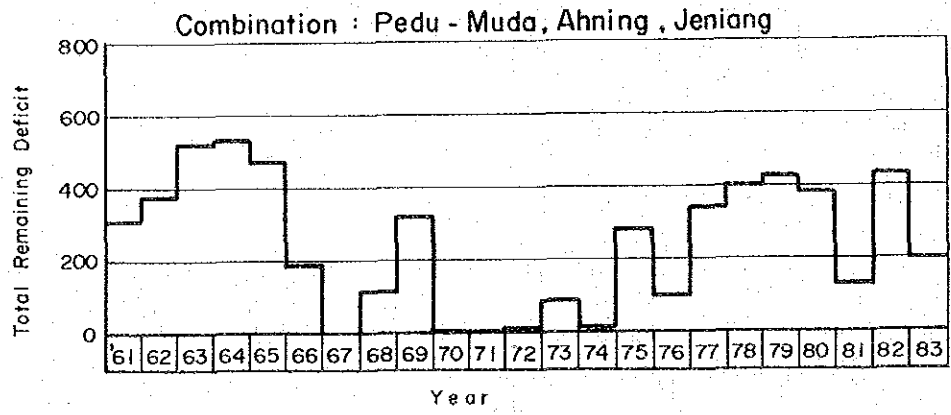
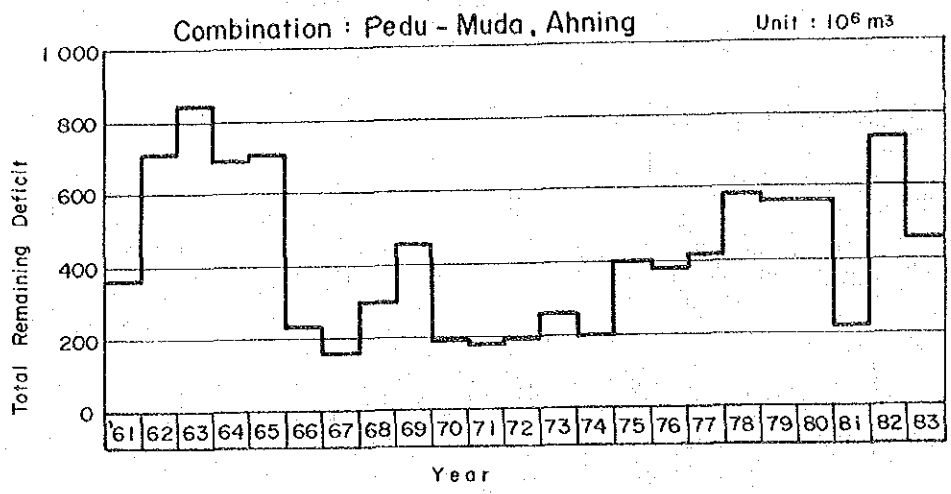


Fig.26 Total Remaining Deficit of Combinations (b) to (e) for 2000 Demand Case 1

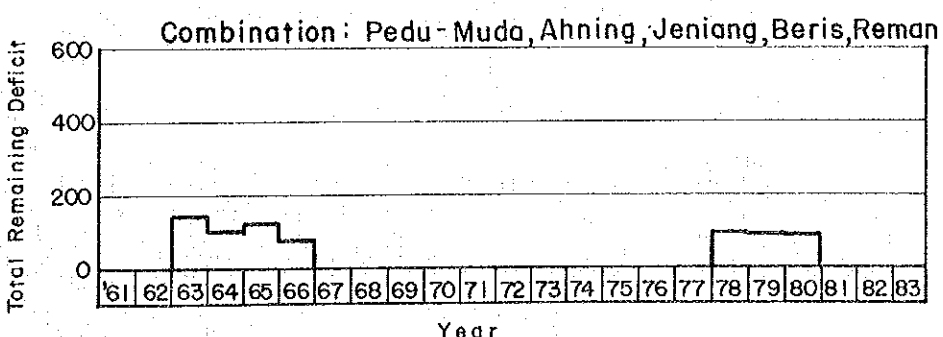
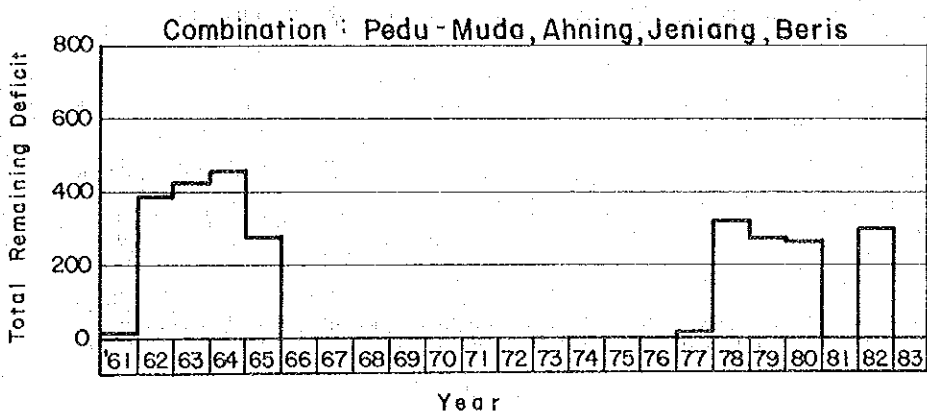
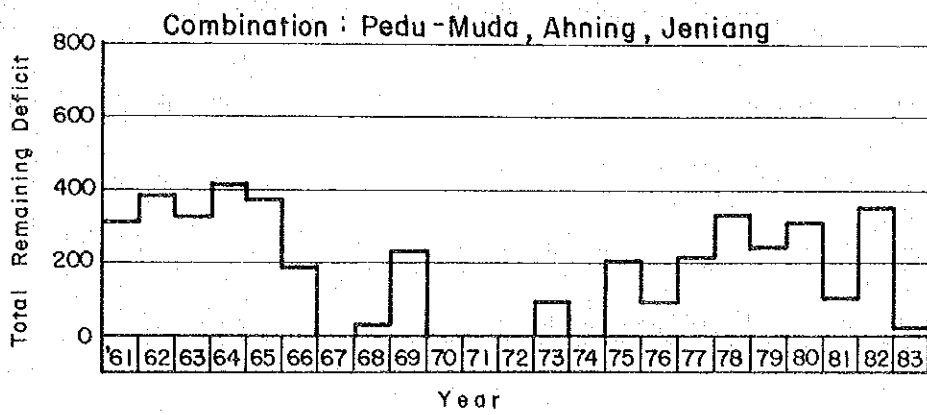
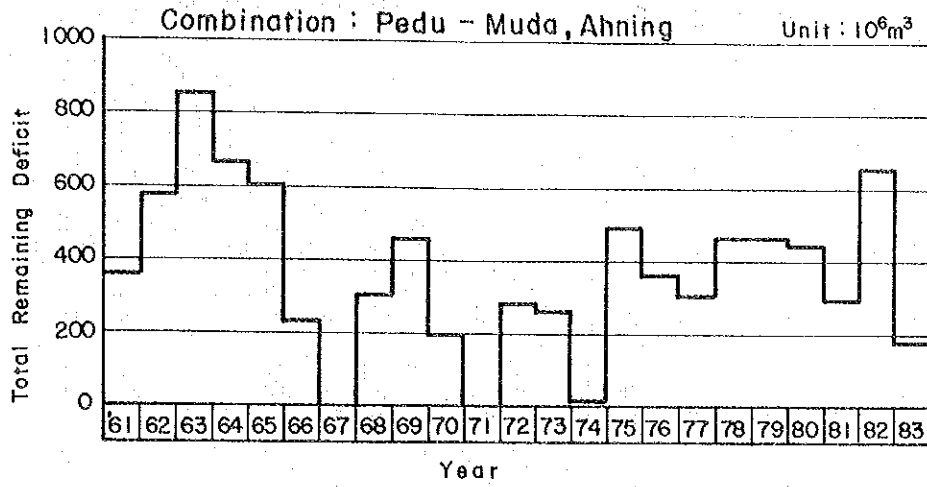


Fig. 27 Total Remaining Deficit of Combinations (b) to (e) for 1990 Demand Case 2

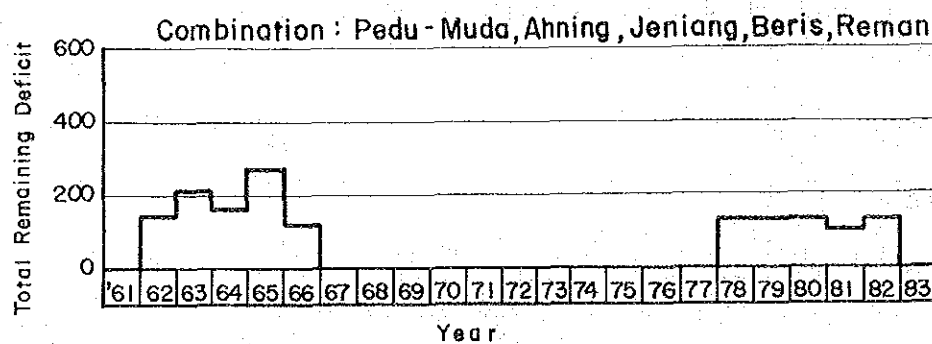
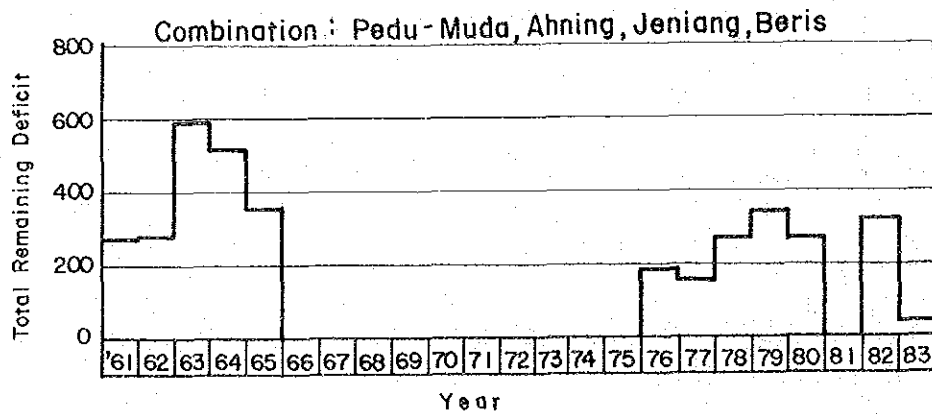
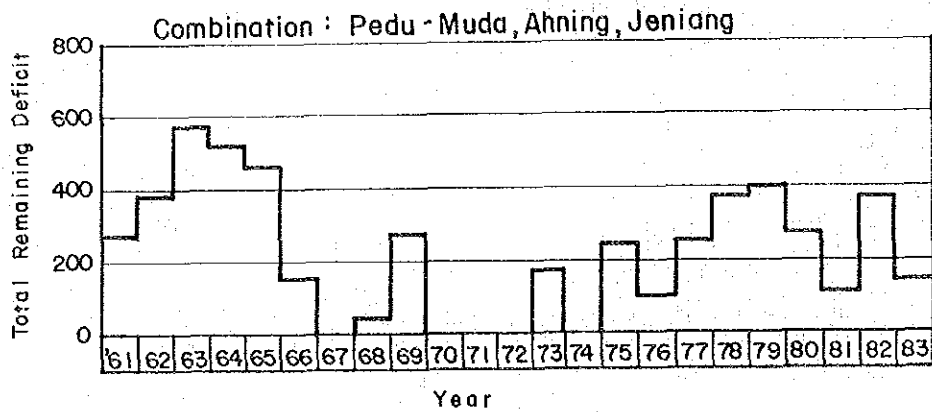
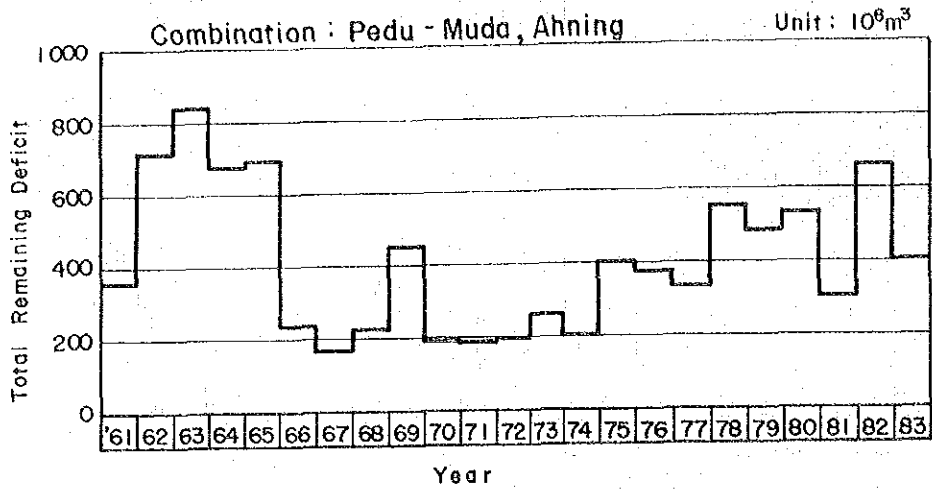


Fig. 28 Total Remaining Deficit of Combinations (b) to (e) for 2000 Demand Case 2

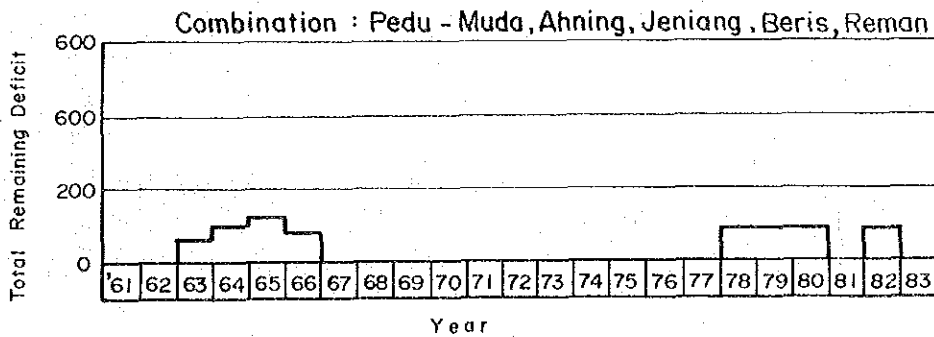
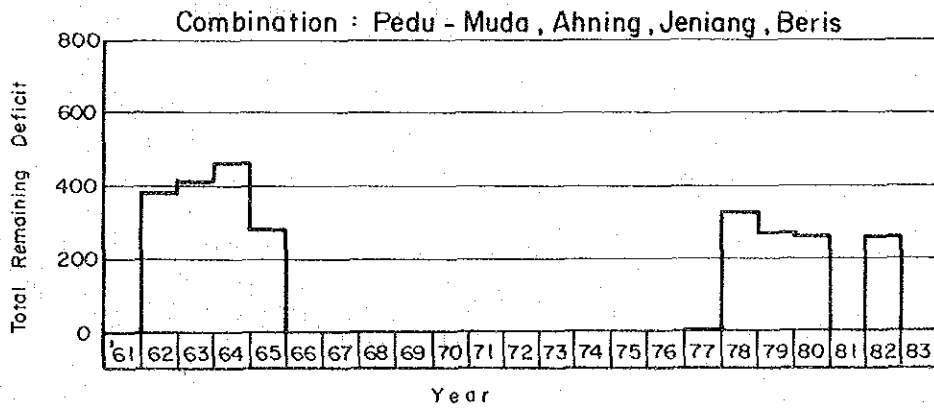
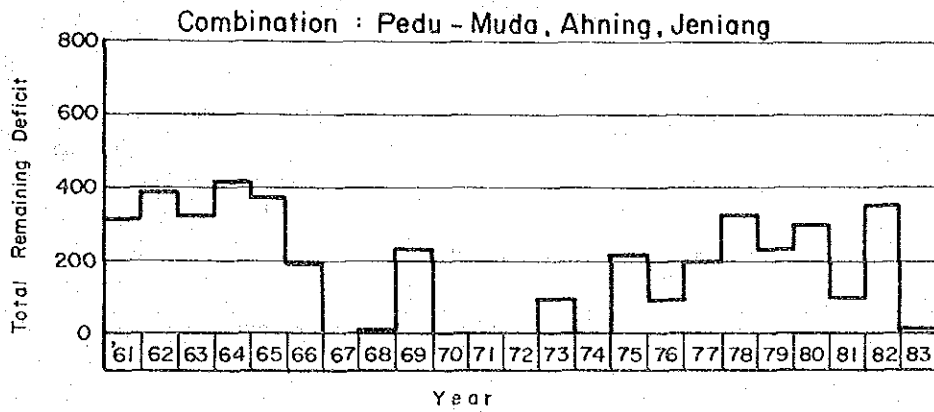
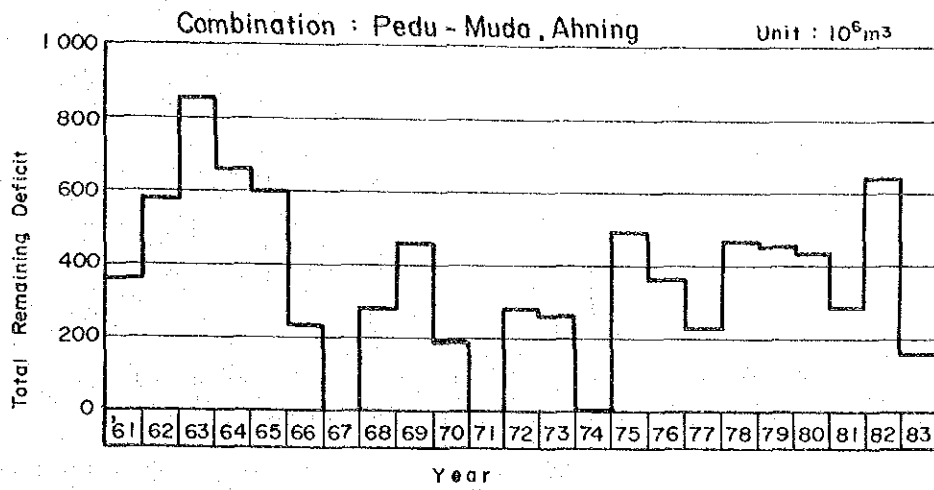


Fig.29 Total Remaining Deficit of Combinations (b) to (e) for 1990 Demand Case 3

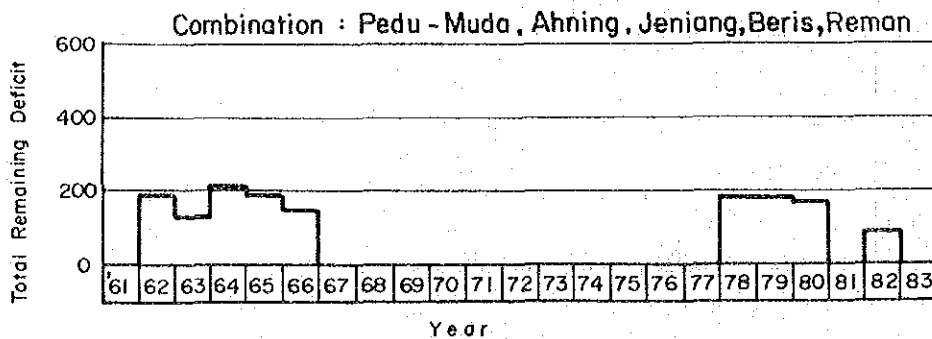
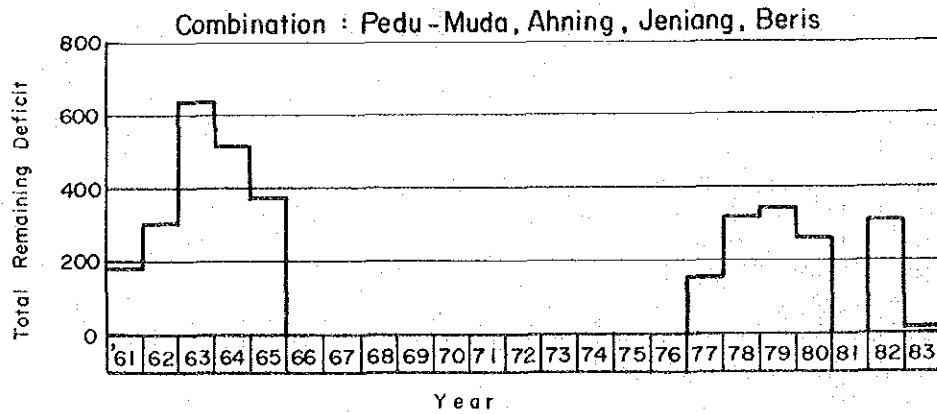
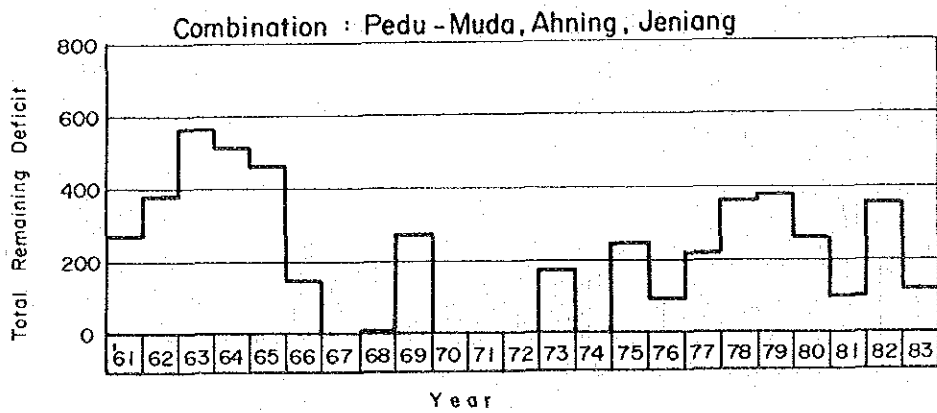
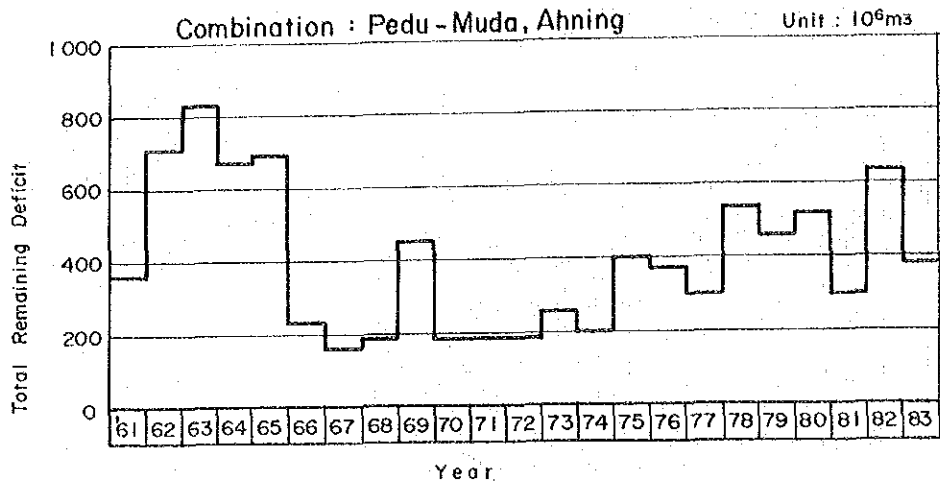


Fig.30 Total Remaining Deficit of Combinations (b) to (e) for 2000 Demand Case 3