

RIVER WATER QUALITY

RIVER WATER QUALITY MONITORING

The importance of establishing baselines and detecting changes in river water quality prompted the Department of Environment (DOE) to begin its monitoring programme in 1978. This has since been extended to identifying pollution sources as well. Samples are regularly collected at predetermined stations for in-situ



Photo 7: Water Sampling at an Industrial Site (DOE Photo Library)



Photo 8: Sg Tuaran, (Sabah) (DOE Photo Library)

and laboratory analysis and data interpretation in terms of physico-chemical and biological characteristics. The Water Quality Index (WQI) used to appraise river water quality consists of parameters such as Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Ammoniacal Nitrogen (NH_3N), Suspended Solids (SS) and pH. The WQI serves as a basis for environmental assessment of a watercourse in rela-



Photo 9: Water Sampling at a Polluted River near Industrial Site (DOE Photo Library)

RIVER WATER QUALITY STATUS

In 2004, a total of 926 water quality monitoring stations located within 120 river basins were monitored (Map 2a, 2b & 2c). Out of these 926 monitoring stations, 540 (58%) were found to be clean, 278 (30%) slightly polluted and 108 (12%) polluted (Table 4(a), (b) and (c)). Stations located upstream were generally clean, while those downstream were either slightly polluted or polluted. In terms of river basin water quality, 58 rivers basins (48.3%) were clean compared to 59 river basins in 2003; 53 (44.1%) slightly polluted compared



Photo 8: Illegal Effluent Discharge from Factory Outlet (DOE Photo Library).

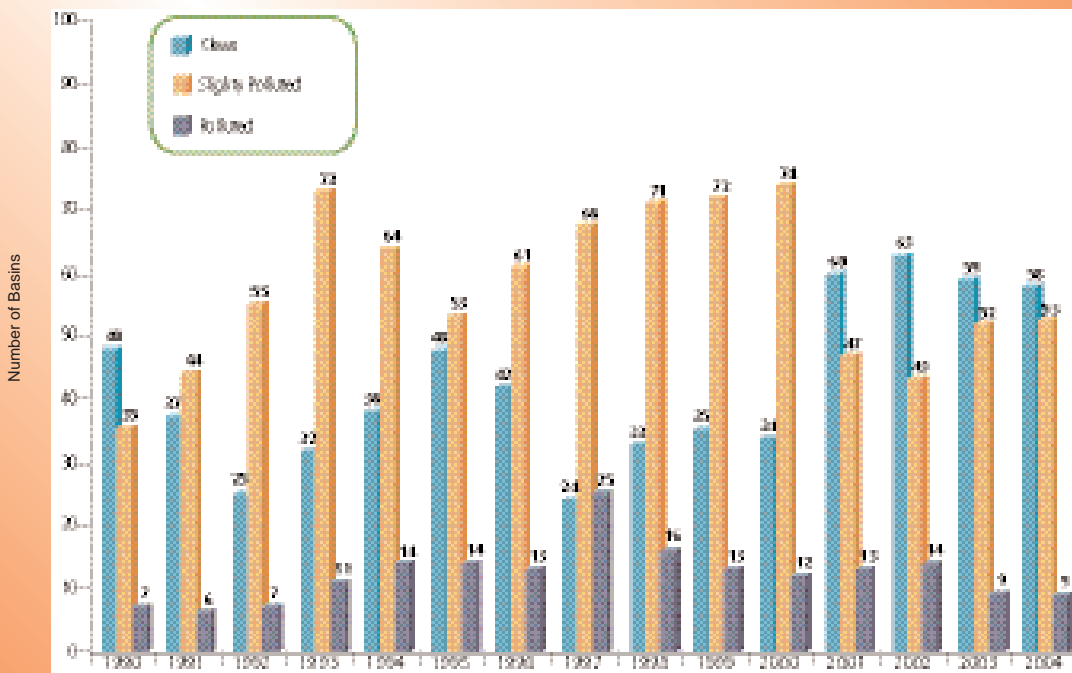


Figure 12 Malaysia: River Basins Water Quality Trend (1990 - 2004)



Photo 10: Water Pollution due to Oil and Grease Contamination (DOE Photo Library)

Cumulative water quality data compiled from 15 continuous water quality monitoring stations are presented in Figures 13, 14, 15 and 16. Based on the 90-percentile value, low dissolved oxygen levels were most frequent in Sg. Putat (34.8% Sat) followed by Sg. Klang (51.0% Sat) and Sg. Perai (53% Sat), (Figure 13). High

ammonium levels were recorded more frequently in Sg.Putat (7.7 mg/l) followed by Sg.Klang (7.1 mg/l) and Sg. Batang Benar (4.6 mg/l), (Figure 14). High turbidity level was most frequently detected in Sg.Klang (1190.1 NTU), followed by Sg.Langat (1023.3 NTU) and Sg.Rajang (782.8 NTU), (Figure 15).

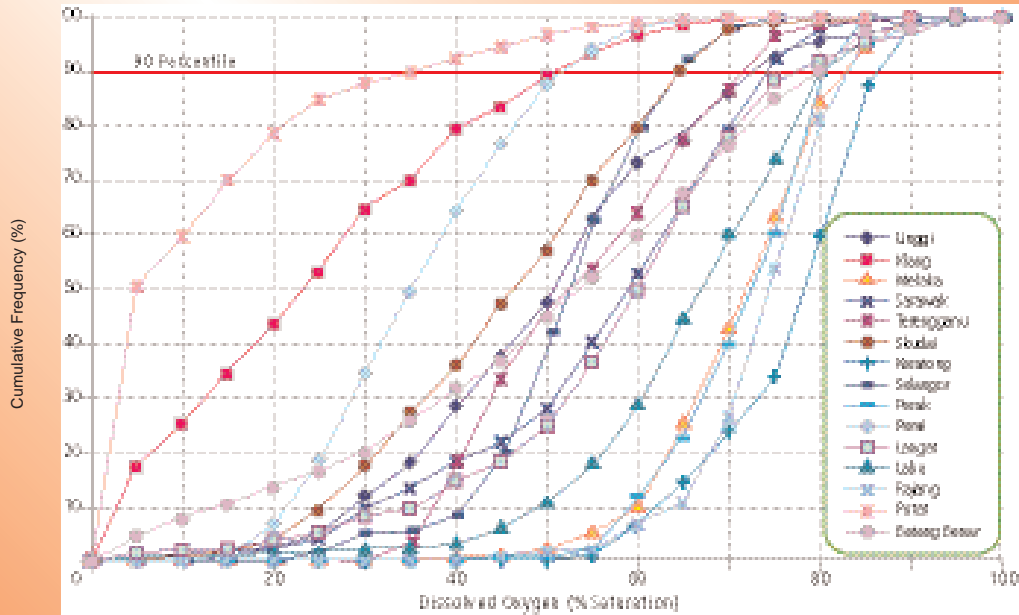


Figure 13 Malaysia: Cumulative Frequency for 15 CWQM Stations (Dissolved Oxygen), 2004

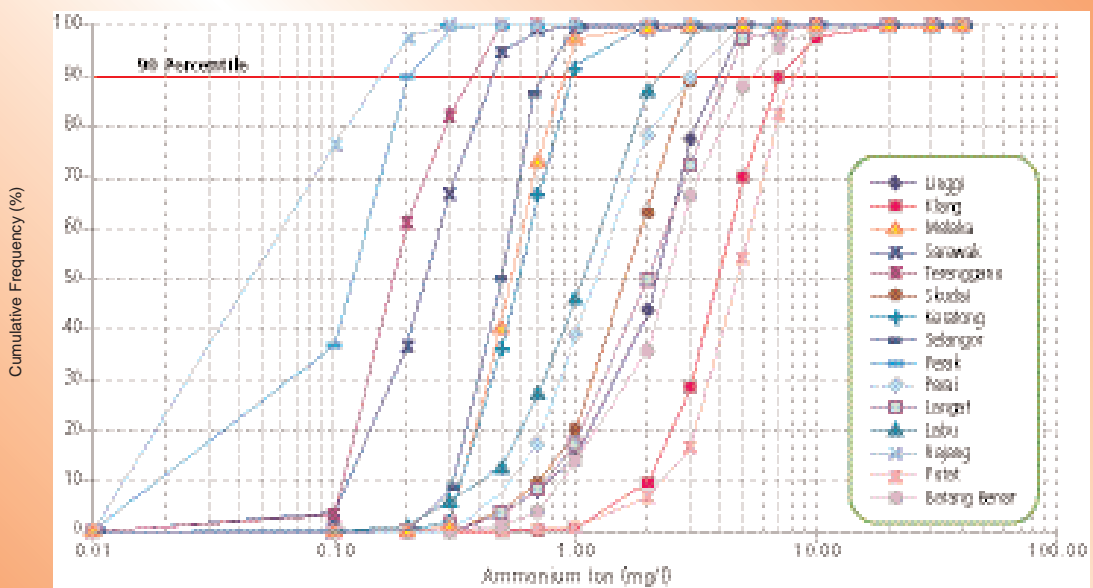


Figure 14 Malaysia: Cumulative Frequency for 15 CWQM Stations (Ammonium Ion Concentration), 2004

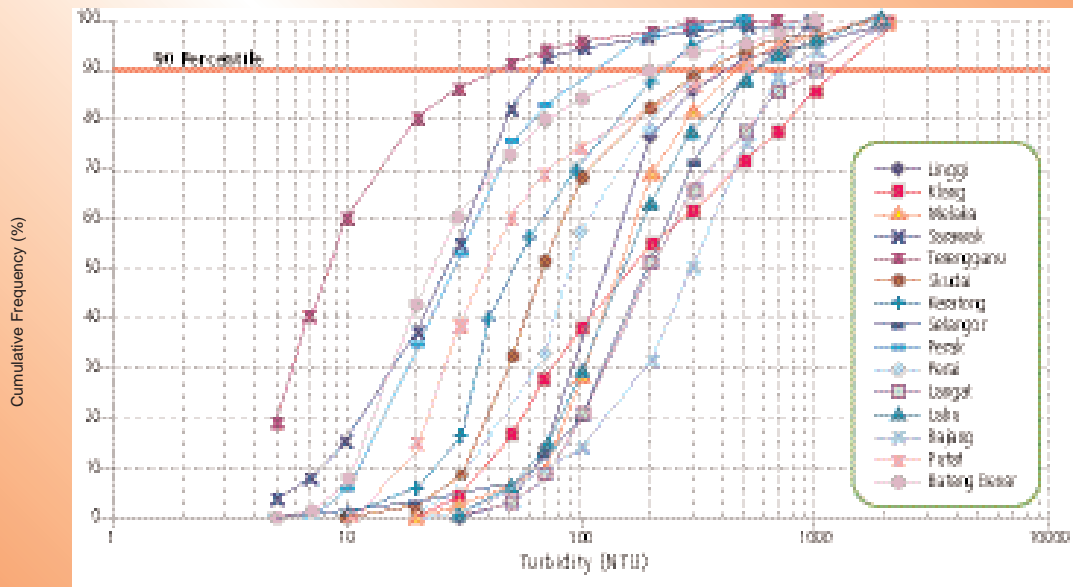


Figure 15 Malaysia: Cumulative Frequency for 15 CWQM Stations (Turbidity), 2004

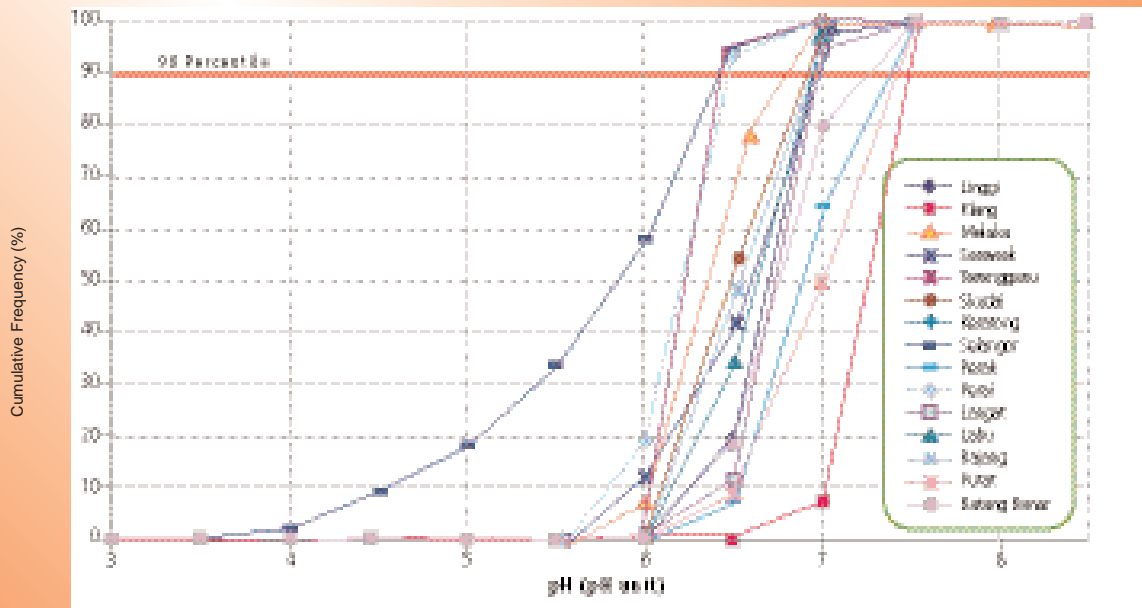


Figure 16 Malaysia: Cumulative Frequency for 15 CWQM Stations (pH Level), 2004

Continuous monitoring is vital for early detection of pollution influx. Over the years, a number of pollution incidences have been observed at many of the continuous monitoring stations. For the period January to December 2004, fifteen river water conditions exerting distinctive pollution influx were observed (Table 3).

Table 3 Malaysia: Pollution Influx Observed at Eleven Continuous Water Quality Monitoring Stations, 2004

Station	Date	Parameter	Potential Source
Sg. Labu	19 Jan	NH ₄ : 3.45 mg/l Turbidity: 1454.13	Sewage or latex-based and industrial
Sg. Batang Benar	7 Jan	NH ₄ : 6.83 mg/l pH: 9.81	Sewage or latex-based and industrial
Sg. Batang Benar	18 Feb	NH ₄ : 6.53 mg/l	Sewage or latex-based
Sg. Batang Benar	25 Feb	NH ₄ : 6.65 mg/l	Sewage or latex-based
Sg. Batang Benar	24 Mac	NH ₄ : 7.35 mg/l	Sewage or latex-based
Sg. Langat	26 Mac	NH ₄ : 6.78 mg/l DO: 1.34 mg/l	Sewage or latex-based
Sg. Putat	9 May	NH ₄ : 8.47 Turbidity: 1369.25 Conductivity: 579.7 DO: 0.87 mg/l	Sewage and earthworks based
Sg Batang Benar	10 May	NH ₄ : 19.42 mg/L	Sewage or latex-based and industrial
Sg Batang Benar	19 May	NH ₄ : 9.35 mg/L DO: 0.00 mg/L	Sewage or latex-based and industrial
Sg Batang Benar	24 June	NH ₄ : 8.11 mg/L DO: 0.15 mg/L	Sewage or latex-based
Sg Langat	22 Aug	NH ₄ : 7.25 mg/L	Sewage or latex-based
Sg Putat	19 Sept	NH ₄ : 8.41 mg/L Cond: 519.25 DO: 0.03 mg/L	Sewage or latex-based and industrial
Sg Skudai	24 Oct	NH ₄ : 8.19 mg/L pH: 3.90	Sewage or industrial
Sg Putat	26 Dec	NH ₄ : 10.43 mg/L DO: 0.75 mg/L	Sewage or latex-based
Sg Batang Benar	24 Dec	NH ₄ : 4.44 mg/L DO: 0.68 mg/L	Sewage or latex-based

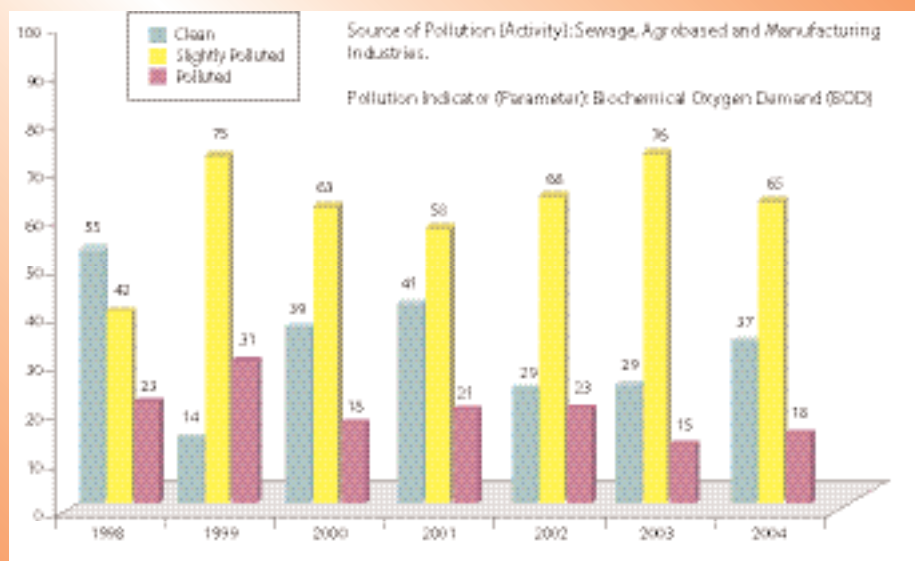


Figure 17 Malaysia: River Basins Water Quality Trend (BOD) 1998-2004

Figures 17, 18 and 19 illustrate the status of river water quality in relation to the major pollution sources. Based on Biochemical Oxygen Demand (BOD) level, 18 river basins were categorized as polluted, 37 river basins as slightly polluted and 65 river basins as clean (Figure 17). High BOD is contributed by untreated or partially treated sewage and discharges from agro-based and manufacturing industries. Based on Ammoniacal Nitrogen, 30 river basins were categorized as polluted, 47 river basins as slightly polluted and 43 river basins as clean (Figure 18). The main source of

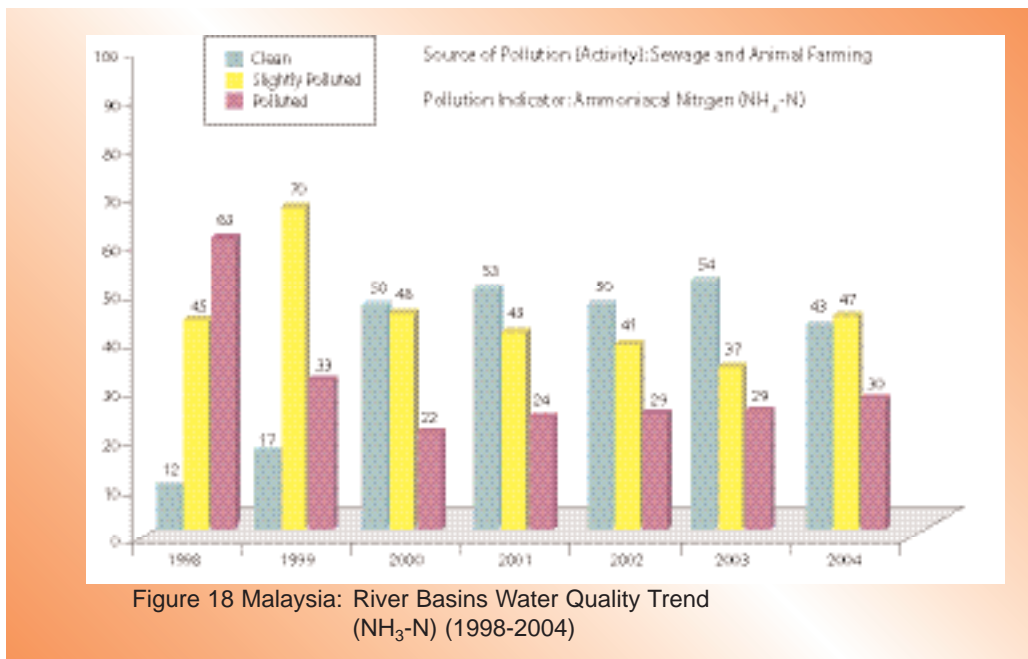


Figure 18 Malaysia: River Basins Water Quality Trend (NH₃-N) (1998-2004)

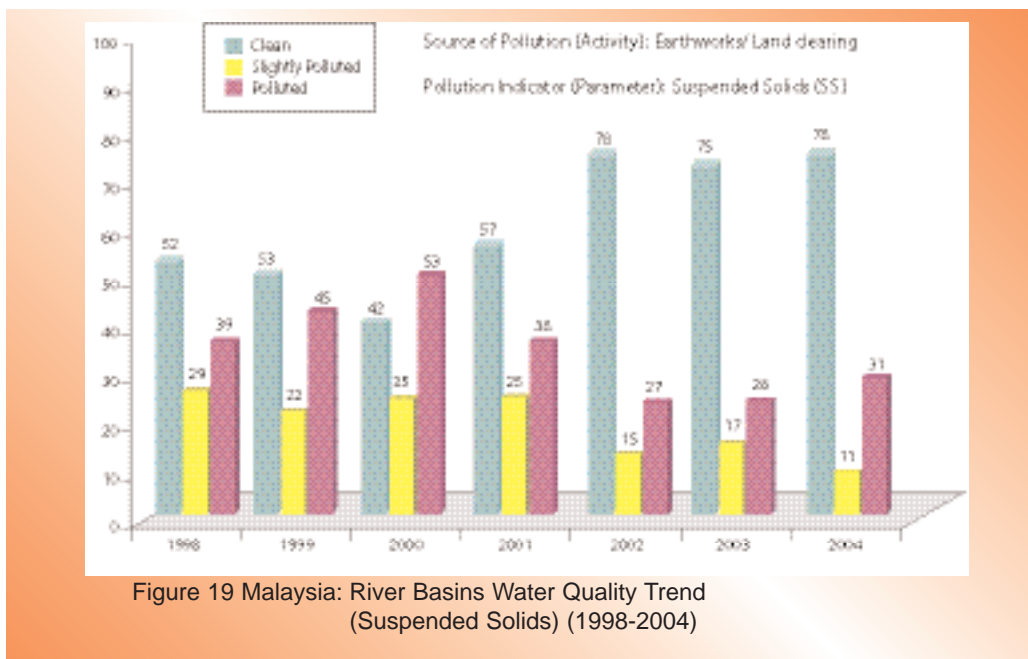


Figure 19 Malaysia: River Basins Water Quality Trend (Suspended Solids) (1998-2004)

of Ammoniacal Nitrogen (NH₃-N) was sewage which include livestock farming and domestic sewage. Meanwhile, 31 river basins were categorized as polluted by suspended solids (SS), 11 river basins as slightly polluted and 78 river basins as clean (Figure 19). The sources for SS were earthworks and land-clearing activities.

Analysis of heavy metals in 5,800 water samples revealed that almost all samples complied

with Class III, Interim National Water Quality Standards for arsenic (As), mercury (Hg), cadmium (Cd), chromium (Cr), lead (Pb) and zinc (Zn), except for iron (Fe) with 78% compliance and zinc (Zn) with 99% compliance.

The trend for river water quality status (1990-2004) is shown in Figure 12. A slight drop in river water quality occurred in 2004. While the number of polluted river basins

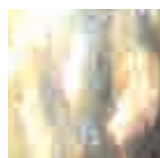
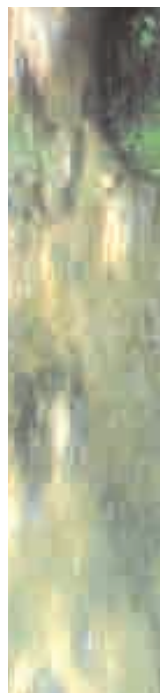


Table 4(a) Malaysia: Water Quality Status within Clean River Basin, 2004

STATE	CODE WQR	RIVER BASIN	NUMBER OF STATIONS	OVERALL WQI	RIVER	NUMBER OF RIVERS	WQI	RIVER STATUS	CLASS
KEDAH	01PL	MELAKA	3	89 (87)	KISAP	1	92	C	II
					MELAKA	1	82	C	II
					PETANG	1	93	C	I
KEDAH / P.PINANG	05	MUDA	9	84 (85)	JERUNG	2	70	SP	III
					KETIL	1	91	C	II
					MUDA	4	87	C	II
					TAWAR	2	89	C	II
PERAK	09	KURAU	5	82 (81)	ARA	1	91	C	II
					KURAU	4	80	SP	II
	10T	TEMERLOH	2	90 (89)	TEMERLOH	2	90	C	II
					11	BERUAS	4	86 (84)	BRUAS
	ROTAN	2	89	C					II
	13	PERAK	53	81 (80)	BATANG PADANG	3	87	C	II
					BIDOR	3	85	C	II
					CHENDERIANG	2	90	C	II
					CUAR	2	91	C	II
					KAMPAR	2	90	C	II
					KANGSAR	2	90	C	II
					KEPAYANG	2	70	SP	III
					KERDAH	2	72	SP	III
					KINTA	6	73	SP	III
					KLAH	2	88	C	II
					KLIAN BARU	2	75	SP	III
					KUANG	1	85	C	II
					PARI	2	69	SP	III
					PELUS	2	85	C	II
					PERAK	8	88	C	II
					PINJI	2	60	SP	III
					RAIA	2	88	C	II
					SELUANG	1	76	SP	III
SEROKAI	2	64	SP	III					
SUNGKAI	2	89	C	II					
SUNGKAI MATI	2	71	SP	III					
TUMBOH	1	72	SP	III					
SELANGOR	16	SELANGOR	9	85 (84)	BATANG KALI	1	92	C	II
					KANCING	1	89	C	II
					KERLING	1	92	C	II
					SELANGOR	4	83	C	II
					SEMBAH	1	68	SP	III
					SERENDAH	1	88	C	II
JOHOR/ NEGERI SEMBILAN	25	MUAR	43	81 (81)	GEMENCHEH	3	89	C	II
					JUASSEH	2	87	C	II
					KELAMAH	2	76	SP	III
					LABIS	4	82	C	II
					MERBUDU	1	69	SP	III
					MERLIMAU	1	73	SP	III
					MUAR	16	82	C	II
					P. MENKUANG	1	86	C	II
					PALONG	4	84	C	II
					SEGAMAT	1	87	C	II
					SENARUT	2	77	SP	II
					SEROM	1	63	SP	III
					SPG. LOI	2	80	SP	II
					TEMARONG	1	92	C	II
					TENANG	2	76	SP	III
					29	JOHOR	44	81 (80)	ANAK SG. SAYONG
	BERANGAN	2	82	C					II
	BKT. BESAR	2	70	SP					III
	CHEMANGAR	1	80	SP					II
	JOHOR	4	87	C					II
	LAYANG	1	92	C					II
	LAYAU KIRI	2	85	C					II
LEBAM	2	84	C	II					
LINGGIU	1	88	C	II					
PENGGELI	2	90	C	II					

Table 4(a) Malaysia: Water Quality Status within Clean River Basin, 2004 (Continued)

STATE	CODE WQR	RIVER BASIN	NUMBER OF STATIONS	OVERALL WQI	RIVER	NUMBER OF RIVERS	WQI	RIVER STATUS	CLASS
JOHOR	30A	SEDILI BESAR	13	83 (84)	REMIS	2	88	C	II
					SANTI	1	83	C	II
					SAYONG	4	87	C	II
					SAYONG	4	87	C	II
					SEBOL	2	81	C	II
					SEMANGER	1	87	C	II
					SEMENCHU	2	82	C	II
					SENING	2	74	SP	III
					SERAI	2	71	SP	III
					TELOR	2	90	C	II
					TEMON	2	87	C	II
					TIRAM	4	76	SP	III
					AMBAT	2	87	C	II
					DOHOL	1	86	C	II
					MUPUR	1	59	P	III
					SEDILI BESAR	5	81	C	II
SEMANGGOT KANAN	1	89	C	II					
SEMANGGOT KIRI	1	89	C	II					
TEMUBOR KANAN	2	87	C	II					
31A	MERSING	1	90 (91)	MERSING	1	90	C	II	
31B	JEMALUANG	2	84 (80)	JEMALUANG	2	84	C	II	
PAHANG	32AE	ANAK ENDAU	2	86 (87)	ANAK ENDAU	2	86	C	II
					ROMPIN	18	85 (85)		
	34	BEBAR/MERCHONG	8	83 (83)	AUR	1	85	C	II
					BAKAR	1	65	SP	III
					JEKATIH	2	90	C	II
					JERAM	1	90	C	II
					KEPASING	1	75	SP	III
					KERATONG	4	88	C	II
					PUKIN	3	89	C	II
					REKOH	1	82	C	II
					ROMPIN	4	85	C	II
					BEBAR	1	83	C	II
	KELAYAT	1	89	C	II				
	MERBA	1	88	C	II				
	MERCHONG	1	69	SP	III				
	SERAI	2	91	C	II				
	TEMIANG	2	75	SP	III				
	35B	BERA	5	85 (85)	BERA	3	84	C	II
					TASIK BERA	1	87	C	II
	35CH	BERTAM	10	89 (85)	TRIANG	1	86	C	II
					BERTAM	2	86	C	II
					BURUNG	1	92	C	II
					HABU	1	90	C	II
					LENGGOK	1	92	C	II
					RINGLET	1	90	C	II
					TELOM	2	89	C	II
	TERLA	1	88	C	II				
	35L	LEPAR	10	87 (87)	TRINGKAP	1	89	C	II
					ANAK SG. LEPAR	1	73	SP	III
					BELAYAR	1	91	C	II
					BERKAPOR	2	85	C	II
					CHINI	1	84	C	II
					LEPAR	3	90	C	II
T. PAYA BUNGOR					1	90	C	II	
TASIK CHINI	1	90	C	II					
35M	MENTIGA	2	88 (84)	MENTIGA	2	88	C	II	
				BATU	1	73	SP	III	
35P	PAHANG	53	88 (88)	BENTONG	4	87	C	II	
				BENUS	2	90	C	II	
				BILUT	1	88	C	II	
				JELAI	2	87	C	II	
				JEMPOL	2	90	C	II	
				JENGA	2	85	C	II	
				KELAU	2	89	C	II	
				KERTAM	1	84	C	II	
				KOYAN	1	91	C	II	
				KUNDANG	1	81	C	II	

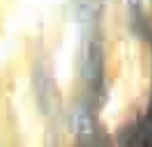


Table 4(a) Malaysia: Water Quality Status within Clean River Basin, 2004 (Continued)

STATE	CODE WQR	RIVER BASIN	NUMBER OF STATIONS	OVERALL WQI	RIVER	NUMBER OF RIVERS	WQI	RIVER STATUS	CLASS				
					LIPIS	3	90	C	II				
					LUIT	1	89	C	II				
					MARAN	2	87	C	II				
					PAHANG	9	88	C	II				
					PENJURING	1	93	C	I				
					PERTANG	2	88	C	II				
					PERTING	1	91	C	II				
					SEMANTAN	3	88	C	II				
					SERTING	2	81	C	II				
					SIAM	1	90	C	II				
					TANGLIR	1	90	C	II				
					TEKAL	1	82	C	II				
					TEKAM	2	90	C	II				
					TELANG	1	90	C	II				
					TELEMONG	2	89	C	II				
TERENGGANU	37	BALOK/TONGGOK	5	81 (79)	TERANUM	1	94	C	I				
					TERAS	1	93	C	I				
					BALOK	2	76	SP	III				
					TONGGOK	3	84	C	II				
					CERATING	1	82	C	II				
					39K	KERTIH	2	86 (88)	KERTIH	2	86	C	II
									PAKA	10	85 (85)		
					40	PAKA	4	87	PAKA	4	87	C	II
									RASAU	2	85	C	II
					41	DUNGUN	4	87 (89)	RENGAT	2	78	SP	II
									DUNGUN	2	88	C	II
					42M	MARANG	5	84 (84)	TELEMBOH	2	86	C	II
									KERAK	2	77	SP	II
					43	TERENGGANU	9	85 (87)	MARANG	1	90	C	II
									TEMALA	2	89	C	II
44	SETIU	3	88 (84)	BERANG	2	90	C	II					
				NERUS	3	89	C	II					
46	BESUT	4	88 (89)	PUEH	2	78	SP	II					
				TERENGGANU	2	83	C	II					
KELANTAN	47K	KEMASIN	38	87 (88)	SETIU	1	91	C	II				
					TAROM	2	87	C	II				
					BESUT	2	91	C	II				
					JERTIH	2	85	C	II				
					48	KELANTAN	1	84 (83)	KEMASIN	1	84	C	II
									ARING	2	86	C	II
					49	GOLOK	4	87 (89)	BELATOP	2	80	SP	II
									BER	1	89	C	II
					50	KAYAN	4	84 (85)	BEROK	2	86	C	II
									BETIS	1	89	C	II
					52	SADONG	6	81 (81)	CHIKU	2	90	C	II
									GALAS	1	89	C	II
					56	RAJANG	18	83 (82)	KELANTAN	4	86	C	II
									KELESA	2	91	C	II
					57	KAYAN	4	84 (85)	KERAK	2	89	C	II
KERILLA	2	92	C	II									
58	SADONG	6	81 (81)	KETIL	2	90	C	II					
				NAL	3	90	C	II					
59	RAJANG	18	83 (82)	PEHI	2	91	C	II					
				PENGKALAN CHEPA	1	77	SP	II					
60	KAYAN	4	84 (85)	PENGKALAN DATU	3	80	SP	II					
				PERGAU	2	91	C	II					
61	SADONG	6	81 (81)	PERTOK	2	86	C	II					
				RELAI	2	88	C	II					
62	RAJANG	18	83 (82)	GOLOK	2	87	C	II					
				TASIK GARU	2	87	C	II					
63	KAYAN	4	84 (85)	KAYAN	3	82	C	II					
				SEMATAN	1	91	C	II					
64	SADONG	6	81 (81)	KARANGAN	1	78	SP	II					
				SADONG	3	77	SP	II					
65	RAJANG	18	83 (82)	TARAT	2	89	C	II					
				BINATANG	1	91	C	II					

Table 4(a) Malaysia: Water Quality Status within Clean River Basin, 2004 (Continued)

STATE	CODE WQR	RIVER BASIN	NUMBER OF STATIONS	OVERALL WQI	RIVER	NUMBER OF RIVERS	WQI	RIVER STATUS	CLASS							
SABAH	60	TATAU	1	85 (76)	JULAU	1	90	C	II							
					MERADONG	1	86	C	II							
					RAJANG	14	81	C	II							
					SARIKEI	1	84	C	II							
					TATAU	1	85	C	II							
					62	SIMILAJAU	1	82 (88)	SIMILAJAU	1	82	C	II			
									SUAI	1	82 (78)	SUAI	1	82	C	II
												KABULOH	6	81 (77)	KABULOH	2
					68	LIMBANG	5	81 (83)	KEJAPIL	1	87	C	II			
									SATAP	1	82	C	II			
									SIBUTI	2	82	C	II			
									LIMBANG	5	81	C	II			
									TRUSAN	1	86 (81)	TRUSAN	1	86	C	II
					70	LAWAS	2	87 (88)	LAWAS	2	87	C	II			
	71	MENGGALONG	3	90 (88)					LAKUTAN	1	89	C	II			
					LINGKUNGAN	1	91	C	II							
					MENGGALONG	1	89	C	II							
	72	PADAS	7	90 (90)	BUNSI	1	91	C	II							
					LIAWAN	1	94	C	I							
					PADAS	3	88	C	II							
					PANGATAN	1	86	C	II							
					TANDULU	1	93	C	I							
					MEMBAKUT	1	91	C	II							
					PAPAR	2	92	C	II							
					DAMIT/TUARAN	6	90 (90)	DAMIT	2	89	C	II				
					SONG SAI	1	92	C	II							
					TUARAN	3	90	C	II							
	78	KEDAMAIAN	3	90 (91)	TEMPASUK	2	92	C	II							
					TENGHILAN	1	87	C	II							
					BENGGOKA	1	91	C	II							
	80	BENGGOKA	1	91 (83)	BENGGOKA	1	91	C	II							
					83	SUGUT	6	91 (92)	BONGKUD	1	90	C	II			
	LOHAN	2	91	C					II							
	MERALI	1	91	C					II							
	SUGUT	2	92	C					II							
	KINIPIR	2	86	C					II							
	LIWAGU	2	88	C					II							
	84	LABOK	8	88 (89)	MALIAU	1	93	C	I							
					SAPI	2	84	C	II							
					SUALONG	1	93	C	I							
					KINABATANGAN	2	82	C	II							
					KOYAH	1	83	C	II							
	86	KINABATANGAN	4	81 (82)	TENEGANG BESAR	1	77	SP	II							
					SEGAMA	1	85	C	II							
	88	SILABUKAN	2	81 (80)	SILABUKAN	2	81	C	II							
					89	TINGKAYU	1	85 (81)	TINGKAYU	1	85	C	II			
	91	TAWAU	5	84 (86)					APAS	1	91	C	II			
BALUNG									1	86	C	II				
93	UMAS-UMAS	1	82 (86)	TAWAU	3	80	SP	II								
				UMAS-UMAS	1	82	C	II								
94	BRANTIAN	1	81 (86)	BRANTIAN	1	81	C	II								

- NOTE:
1. WQI BASED ON 6 MAJOR PARAMETERS: BOD, COD, SS, pH, DO, NH₃-N
 2. RIVER WATER QUALITY STATUS: C: CLEAN, SP: SLIGHTLY POLLUTED, P: POLLUTED
 3. RIVER CLASS BASED ON INWQS
 4. () Overall WQI for 2003
 5. OVERALL WQI FOR RIVER BASIN IS CALCULATED BY AVERAGING WQI FROM ALL SAMPLING STATIONS IN EACH BASIN THROUGHOUT THE YEAR

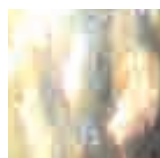
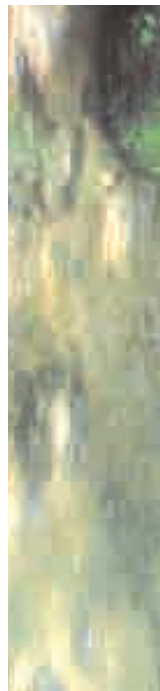


Table 4(b) Malaysia: Water Quality Status within Slightly Polluted River Basin, 2004

STATE	CODE WQR	RIVER BASIN	NUMBER OF STATIONS	OVERALL WQI	RIVER	NUMBER OF RIVERS	WQI	RIVER STATUS	CLASS					
PERLIS	1	PERLIS	10	78 (77)	ARAU	1	67	SP	III					
					JARUM	1	81	C	II					
					JERNIH	2	76	SP	III					
					KOK MAK	1	79	SP	II					
					NGULANG	1	82	C	II					
					PERALIT	1	88	C	II					
					PERLIS	1	71	SP	III					
					SERAI	1	84	C	II					
					TASOH	1	79	SP	II					
					KEDAH	1	64	SP	III					
KEDAH	03	KEDAH	6	79 (82)	PADANG TERAP	3	81	C	II					
					PEDU	1	86	C	II					
					TEKAI	1	83	C	II					
					KEDAH	04	MERBOK	10	65 (64)	BAKAR ARANG	1	58	P	III
										BATU	1	38	P	IV
										BONGKOK	1	74	SP	III
BUKIT MERAH	1	80	SP	II										
KOROK	1	58	P	III										
MERBOK	1	74	SP	III										
PETANI	1	56	P	III										
TOK PAWANG	2	75	SP	III										
TUPAH	1	61	SP	III										
P. PINANG/ KEDAH	06P	PERAI	22	63 (66)	AIR MELINTAS	1	41	P	IV					
					JARAK	6	69	SP	III					
					KELADI	1	76	SP	III					
					KEREH	4	54	P	III					
					KUBANG SEMANG	2	59	P	III					
					KULIM	3	87	C	II					
					PERAI	2	67	SP	III					
					SELUANG	1	58	P	III					
					SELUANG BAWAH	2	58	P	III					
P. PINANG/ PERAK	08	KERIAN	10	76 (75)	KECHIL	3	80	SP	II					
					KERIAN	4	79	SP	II					
					SELAMA	2	70	SP	III					
					SERDANG	1	64	SP	III					
PERAK	10	SEPETANG	10	75 (75)	BATU TEGUH	2	77	SP	II					
					JANA	1	91	C	II					
					LARUT	1	67	SP	III					
					LIDIN	1	61	SP	III					
					MALAI	1	60	SP	III					
	SEPETANG	3	78	SP	II									
	TUPAI	1	84	C	II									
	12	RAJA HITAM/ MANJONG	6	73 (68)	DERHAKA	2	61	SP	III					
					MANJONG	2	81	C	II					
					RAJA HITAM	2	76	SP	III					
12W	WANGI/DERALIK	4	69 (64)	DERALIK	2	76	SP	III						
				WANGI	2	62	SP	III						
PERAK/ SELANGOR	14	BERNAM	10 79	(80)	BERNAM	6	74	SP	III					
					SLIM	2	89	C	II					
					TEROLAK	2	87	C	II					
SELANGOR	15	TENGI	2	78 (79)	TENGI	2	78	SP	II					
					19	LANGAT	28	70 (71)	ANAK CHUAU	1	80	SP	II	
	BALAK	1	60	SP	III									
	BATANG BENAR	2	58	P	III									
	BATANG LABU	2	75	SP	III									
	BATANG NILAI	2	49	P	IV									
	BERANANG	1	83	C	II									
	BUAN	1	70	SP	III									
	CHUAU	2	89	C	II									
	JIJAN	1	85	C	II									
	LANGAT	8	68	SP	III									
	LIMAU MANIS	1	76	SP	III									
	LUI	1	89	C	II									

Table 4(b) Malaysia: Water Quality Status within Slightly Polluted River Basin, 2004 (Continued)

STATE	CODE WQR	RIVER BASIN	NUMBER OF STATIONS	OVERALL WQI	RIVER	NUMBER OF RIVERS	WQI	RIVER STATUS	CLASS							
NEGERI SEMBILAN	20	SEPANG	3	72 (74)	PAJAM	1	78	SP	II							
					RINCHING	1	77	SP	II							
					SEMENYIH	3	82	C	II							
					SEPANG	3	72	SP	III							
	20J	LUKUT	1	75 (74)	LUKUT	1	75	SP	III							
	21		LINGGI	15	77 (76)	BATANG PENAR	1	55	P	III						
	MELAKA	22	MELAKA	17	73 (73)	CHEMBONG	1	84	C	II						
						KEPAYONG	1	75	SP	III						
						KUNDUR BESAR	1	92	C	II						
						LINGGI	6	74	SP	III						
						PEDAS	1	87	C	II						
						REMBAU	2	83	C	II						
						SIMIN	1	70	SP	III						
						TEMIANG	1	77	SP	II						
						23	DUYONG	3	76 (72)	BTG.MELAKA	2	87	C	II		
DURIAN TUNGGAL										1	83	C	II			
MELAKA		9	71	SP	III											
PUTAT		2	59	P	III											
REMBIA		2	77	SP	II											
24		KESANG/MERLIMAU	8	71 (71)	TAMPIN	1	87	C	II							
					DUYONG	3	76	SP	III							
	CHOHONG				2	85	C	II								
	KESANG				3	79	SP	II								
	MERLIMAU				3	54	P	III								
JOHOR	26	BATU PAHAT	23	75 (75)	AMRAN	2	72	SP	III							
					BATU PAHAT	1	60	SP	III							
					BEKOK	4	80	SP	II							
					BERLIAN	2	82	C	II							
					CHAAH	2	87	C	II							
					LENIK	1	82	C	II							
					MEREK	2	86	C	II							
					MERPO	2	85	C	II							
					SEMBERONG	2	63	SP	III							
					SIMPANG KANAN	2	58	P	III							
					SIMPANG KIRI	3	67	SP	III							
					AIR BALOI	3	67	SP	III							
					BENUT	4	74	SP	III							
					PT. HAJI YASSIN	2	73	SP	III							
					ULU BENUT	1	78	SP	II							
	27A	AIR BALOI	3	67 (54)	AIR HITAM	1	66	SP	III							
					AYER MERAH	1	55	P	III							
					PONTIAN BESAR	3	74	SP	III							
	27B	BENUT	7	74 (77)	PONTIAN BESAR	3	74	SP	III							
					PONTIAN KECIL	2	75	SP	III							
					SKUDAI	11	65 (70)	SP	III							
	28A	PONTIAN BESAR	5	68 (61)	MELANA	2	59	P	III							
					SKUDAI	9	66	SP	III							
					PLENTONG	1	49	P	IV							
	28B	PONTIAN KECIL	2	75 (75)	TEBRAU	4	73	SP	III							
					TEBRAU	4	73	SP	III							
					RAMBAH	2	70	SP	III							
	28C	SKUDAI	11	65 (70)	RAMBAH	2	70	SP	III							
					ANAK SEDILI KECIL	1	37	P	IV							
					BAHAN	2	82	C	II							
	28D	TEBRAU	5	68 (77)	SEDILI KECIL	2	78	SP	II							
					PALOI	2	82	C	II							
					A.S. SEMBERONG	2	82	C	II							
	28G	RAMBAH	2	70 (63)	DENGAR	2	84	C	II							
					ENDAU	1	86	C	II							
JEBONG					1	69	SP	III								
LENGA					2	64	SP	III								
LENGGOR					2	83	C	II								
MAMAI					2	83	C	II								
MELANTAI					2	69	SP	III								
MENGKIBOL					3	81	C	II								
PALOH					2	83	C	II								
PAMOL					1	39	P	IV								
30B					SEDILI KECIL	5	71 (74)	SEMBERONG	5	82	C	II				
								SINGOL	2	77	SP	II				
								TAMOK	2	89	C	II				
								30C	PALOI	2	80 (82)	SEMENYIH	3	81	C	II
												PALOH	2	83	C	II
32	ENDAU	29	78 (79)	PAMOL	1	39	P	IV								
				SEMBERONG	5	82	C	II								



Table 4(b) Malaysia: Water Quality Status within Slightly Polluted River Basin, 2004 (Continued)

STATE	CODE WQR	RIVER BASIN	NUMBER OF STATIONS	OVERALL WQI	RIVER	NUMBER OF RIVERS	WQI	RIVER STATUS	CLASS
PAHANG	32/33	PONTIAN	3	80 (80)	PONTIAN	2	89	C	II
		SEPAYANG	1		62	SP	III		
	35	SERTING	5	79 (78)	MOKEK	2	83	C	II
		SERTING	3		76	SP	III		
	36	KUANTAN	11	79 (81)	BELAT	1	87	C	II
					CHARU	1	89	C	II
					GALING BESAR	1	47	P	IV
					GALING KECIL	1	52	P	III
					KENAU	1	87	C	II
					KUANTAN	4	88	C	II
					PINANG	1	77	SP	II
					RIAU	1	79	SP	II
	TERENGGANU	38	KEMAMAN	10	79 (81)	CHERUL	2	89	C
KEMAMAN						2	89	C	II
NERAM						2	82	C	II
PERASING						2	88	C	II
39C		CHUKAI	5	78 (79)	RANSAN	2	48	P	IV
					CHUKAI	1	89	C	II
					IBOK	2	84	C	II
42I		IBAI	3	75 (82)	RUANG	2	66	SP	III
					IBAI	3	75	SP	III
42L		LANDAS	2	71 (60)	LANDAS	2	71	SP	III
KELANTAN SARAWAK	47S	SEMERAK	2	78 (78)	SEMERAK	2	78	SP	II
		SARAWAK	15	79 (80)	KUAP	2	75	SP	III
	51BS	SAMARAHAN	7	80 (82)	MAONG KIRI	1	55	P	III
					SANTUBONG	1	86	C	II
					SARAWAK	6	86	C	II
					SARAWAK KANAN	1	87	C	II
					SARAWAK KIRI	1	92	C	II
					SEMENGGOH	2	68	SP	III
					TABUAN	1	79	SP	II
					SAMARAHAN	2	77	SP	II
					AI	1	87	C	II
					LUPAR	3	74	SP	III
					SEKERANG	1	88	C	II
	54	SARIBAS	2	80 (82)	SETERAP	1	80	SP	II
					UNDUP	1	86	C	II
	55	KERIAN	3	79 (81)	RIMBAS	1	91	C	II
					SARIBAS	1	69	SP	III
	57	OYA	3	75 (75)	KERIAN	2	77	SP	II
					SEBLAK	1	82	C	II
	58	MUKAH	4	75 (77)	OYA	3	75	SP	III
					MUKAH	4	75	SP	III
	59	BALINGIAN	2	78 (80)	BALINGIAN	2	78	SP	II
					KEMENA	2	80	SP	II
	61	KEMENA	3	80 (81)	SIBIU	1	80	SP	II
					NIAH	2	82	C	II
	64	NIAH	5	77 (73)	SEKALOH	3	73	SP	III
					ADONG	1	62	SP	III
	66	MIRI/LUTONG	7	68 (66)	DALAM	1	63	SP	III
					LUTONG	2	75	SP	III
	67	BARAM	4	76 (75)	MIRI	2	69	SP	III
					PADANG LIKU	1	72	SP	III
	76	MOYOG	11	79 (79)	BARAM	4	76	SP	III
					INANAM	3	81	C	II
79	BINGKONGAN	3	64 (68)	LIKAS	1	53	P	III	
				MENGGATAL	2	83	C	II	
				MOYOG	3	91	C	II	
				TELIPOK	2	65	SP	III	
				BANDAU	1	87	C	II	
				MENGGARIS	1	25	P	V	
				TANDEK	1	82	C	II	
				MOUNAD	1	79	SP	II	
				INTAN	1	84	C	II	
				85	KAYA	1	79 (84)		
90	KALUMPANG	5	70 (77)						

Table 4(b) Malaysia: Water Quality Status within Slightly Polluted River Basin, 2004 (Continued)

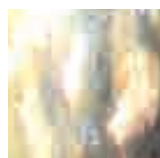
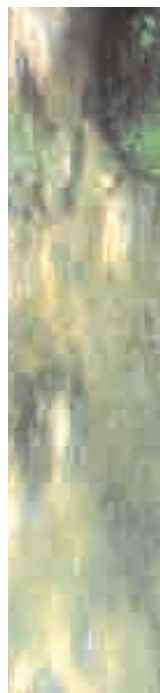
STATE	CODE WQR	RIVER BASIN	NUMBER OF STATIONS	OVERALL WQI	RIVER	NUMBER OF RIVERS	WQI	RIVER STATUS	CLASS
	95	KALABAKAN	2	78 (78)	KALUMPANG	2	86	C	II
					PANG BURONG 1	1	46	P	IV
					PANG BURONG 2	1	52	P	III
					KALABAKAN	2	78	SP	II

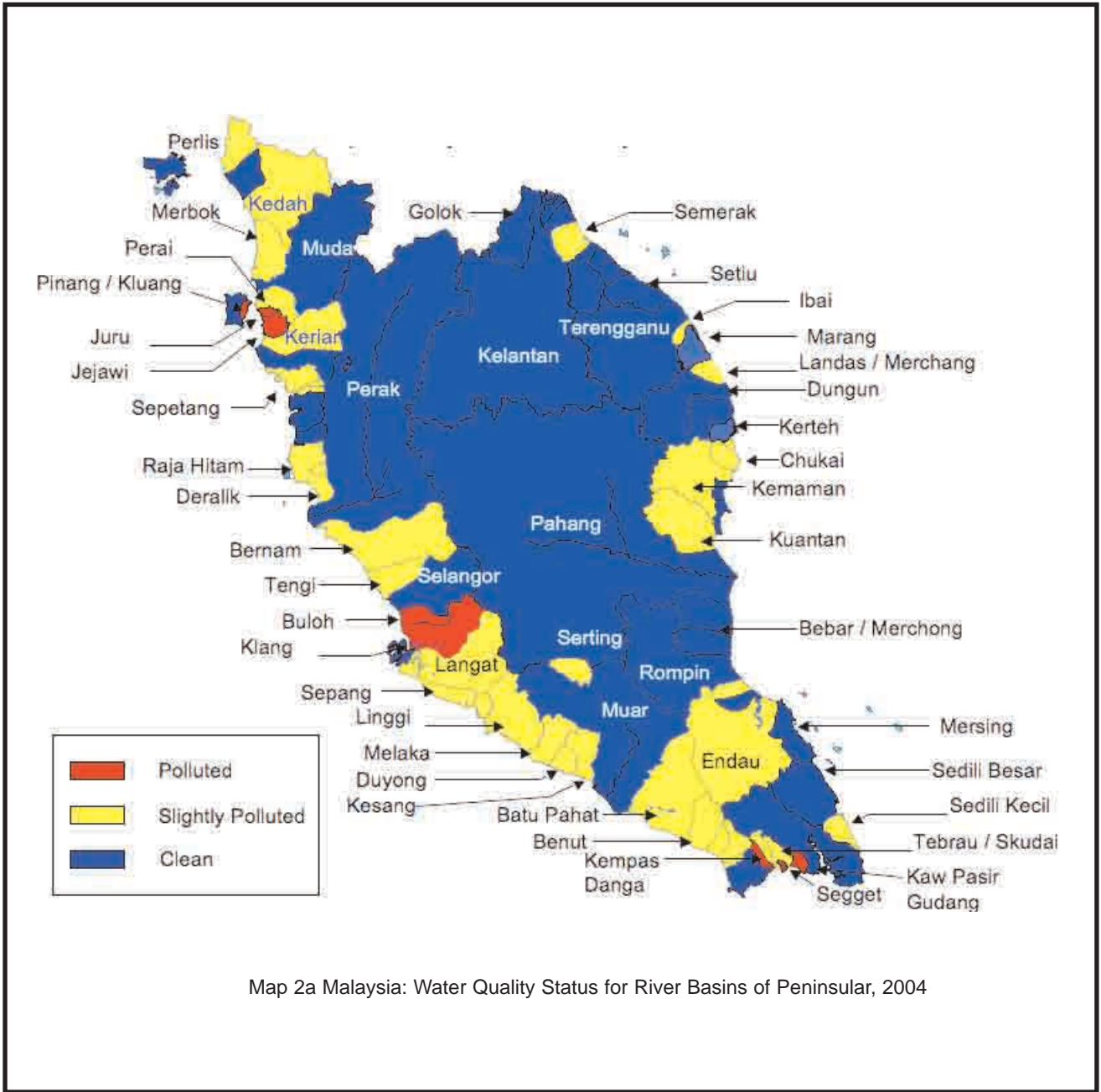
- NOTE: 1. WQI BASED ON 6 MAJOR PARAMETERS: BOD, COD, SS, pH, DO, NH₃-N
 2. RIVER WATER QUALITY STATUS: C: CLEAN, SP: SLIGHTLY POLLUTED, P: POLLUTED
 3. RIVER CLASS BASED ON INWQS
 4. () Overall WQI for 2003
 5. OVERALL WQI FOR RIVER BASIN IS CALCULATED BY AVERAGING WQI FROM ALL SAMPLING STATIONS IN EACH BASIN THROUGHOUT THE YEAR

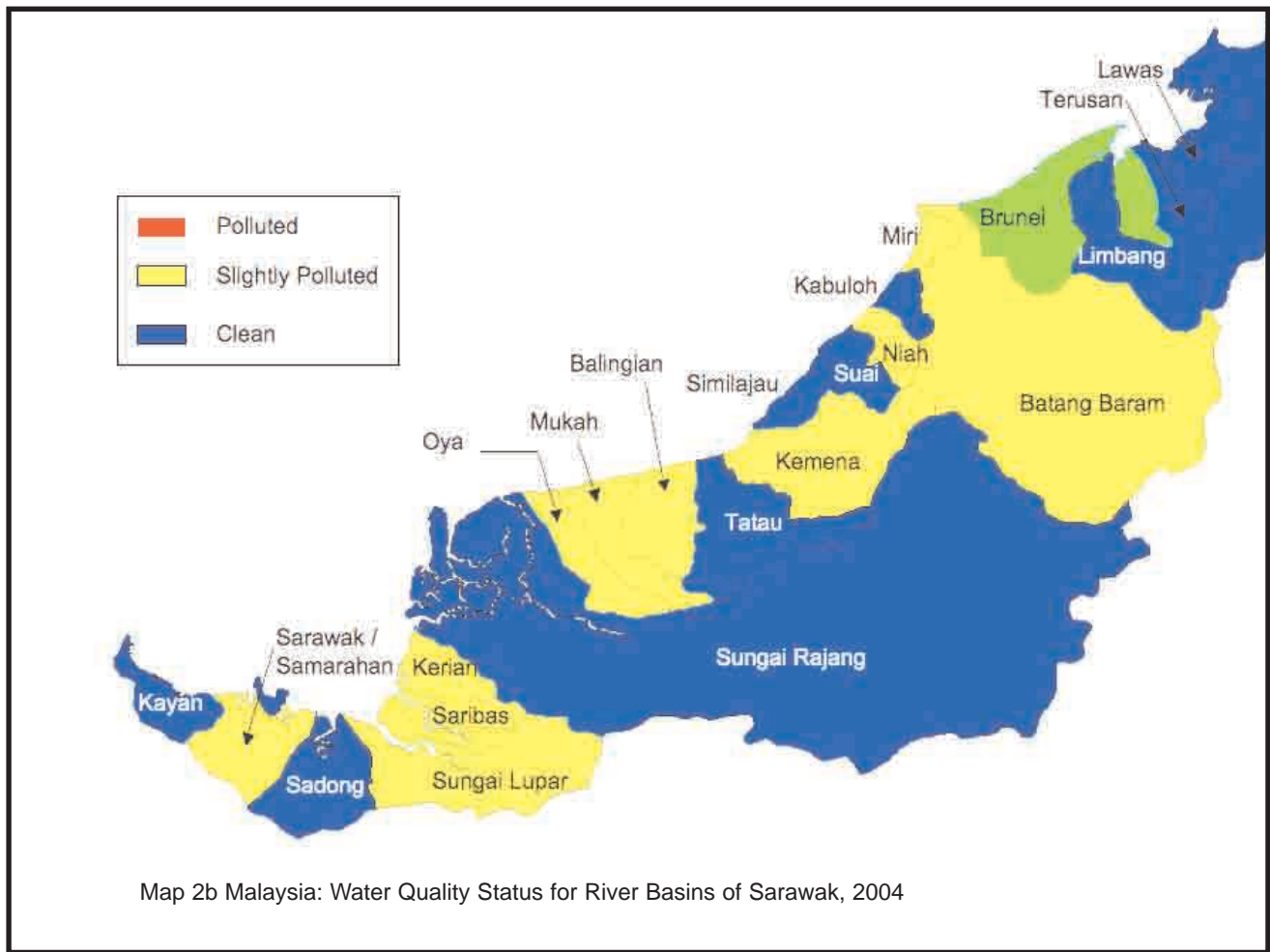
Table 4(c) Malaysia: Water Quality Status within Polluted River Basin, 2004

STATE	CODE WQR	RIVER BASIN	NUMBER OF STATIONS	OVERALL WQI	RIVER	NUMBER OF RIVERS	WQI	RIVER STATUS	CLASS
PULAU PINANG	06J	JURU	8	49 (51)	ARA	1	51	P	IV
					JURU	1	47	P	IV
					KILANG UBI	2	46	P	IV
					PASIR	1	44	P	IV
	06PP	PINANG/KLUANG	12	46 (53)	RAMBAI	3	52	P	III
					AIR ITAM	5	47	P	IV
					AIR TERJUN	1	87	C	II
					DONDANG	3	47	P	IV
					JELUTONG	1	29	P	V
	07	JEJAWI	5	58 (60)	KLUANG	1	60	SP	III
					PINANG	1	41	P	IV
					CEMPEDAK	1	41	P	IV
					JAWI	3	67	SP	III
SELANGOR	17	BULOH	5	48 (58)	JUNJONG	1	48	P	IV
					BULOH	5	48	P	IV
	18	KLANG	24	54 (58)	AMPANG	1	54	P	III
					BATU	2	59	P	III
					DAMANSARA	3	53	P	III
					GOMBAK	3	66	SP	III
					JINJANG	1	50	P	IV
					KERAYONG	1	52	P	III
					KEROH	1	51	P	IV
					KLANG	10	52	P	III
KUYOH	1	1	1	1	1	56	P	III	
									PENCALA
JOHOR	28	SEGGET	5	50 (54)	SEGGET	5	50	P	IV
	28E	KEMPAS	2	45 (44)	KEMPAS	2	45	P	IV
	28F	DANGA	2	55 (52)	DANGA	2	55	P	III
	29B	KAW. PASIR GUDANG (TUKANG BATU)	5	40 (47)	BULUH	1	29	P	V
					LATOH	1	52	P	III
					MASAI	1	57	P	III
					PEREMBI	1	35	P	IV
TUKANG BATU	1	25	P	V					

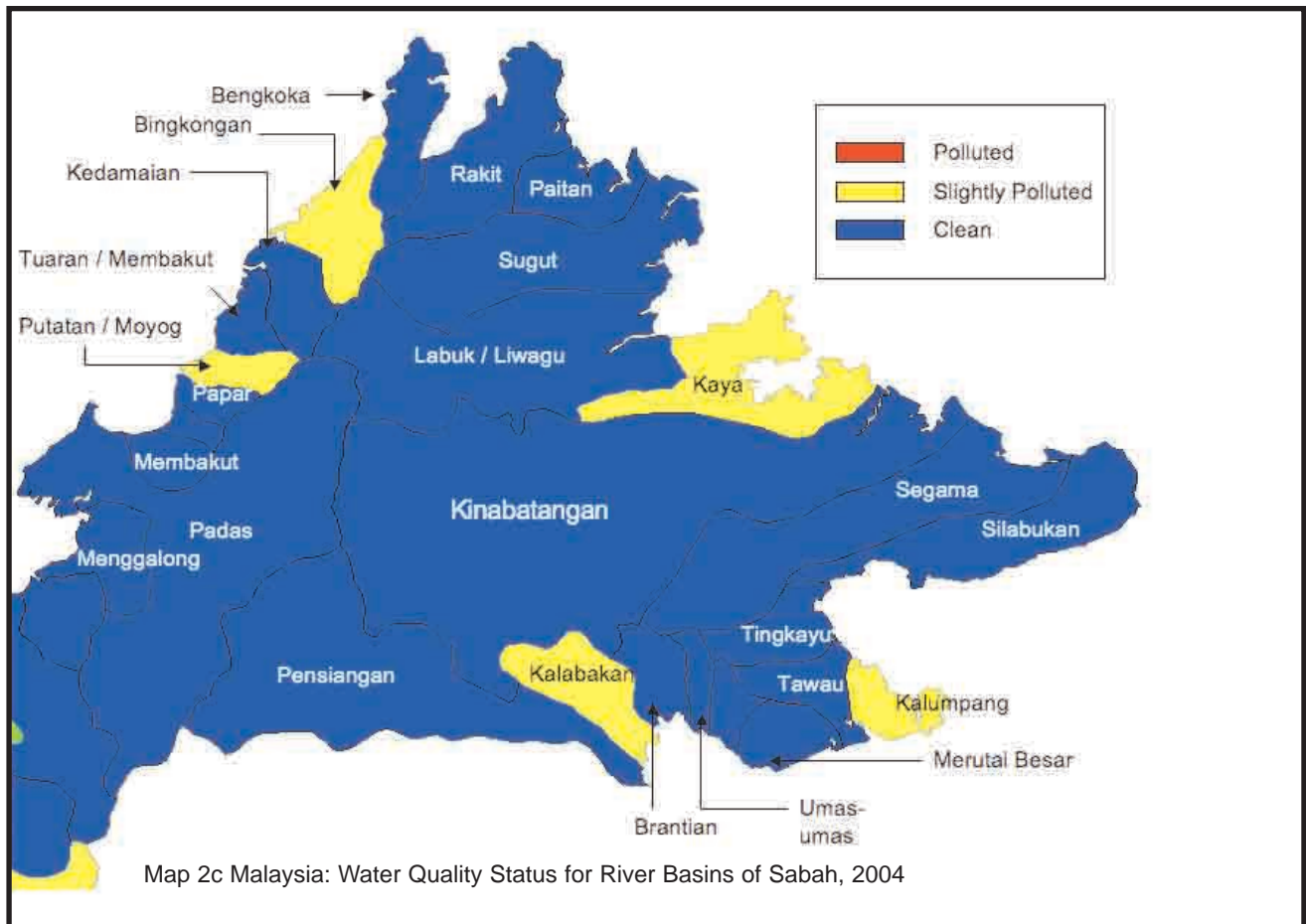
- NOTE: 1. WQI BASED ON 6 MAJOR PARAMETERS: BOD, COD, SS, pH, DO, NH₃-N
 2. RIVER WATER QUALITY STATUS: C: CLEAN, SP: SLIGHTLY POLLUTED, P: POLLUTED
 3. RIVER CLASS BASED ON INWQS
 4. () Overall WQI for 2003
 5. OVERALL WQI FOR RIVER BASIN IS CALCULATED BY AVERAGING WQI FROM ALL SAMPLING STATIONS IN EACH BASIN THROUGHOUT THE YEAR



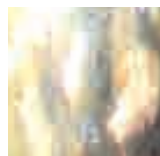
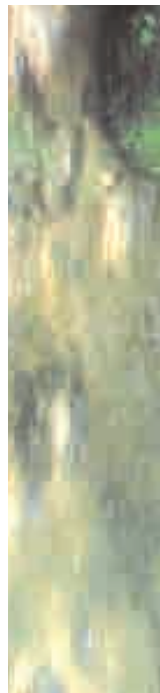




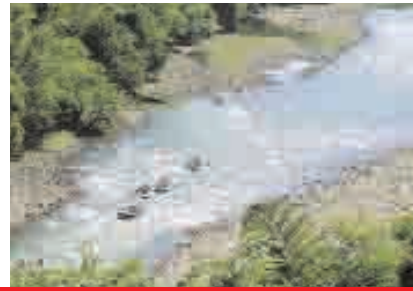
Map 2b Malaysia: Water Quality Status for River Basins of Sarawak, 2004



Map 2c Malaysia: Water Quality Status for River Basins of Sabah, 2004







River Water Quality

