Chapter 3: River Water Quality

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RIVER WATER QUALITY MONITORING

The Department of Environment (DOE) continued with the river water quality monitoring programme in 2009 to detect changes in river water quality and to identify pollution sources. Water samples were collected at regular intervals from designated stations for in-situ and laboratory analysis to determine its physico-chemical and biological characteristics. The Water Quality Index (WQI) was used as a basis for assessment of a watercourse in relation to pollution load categorization and designation of classes of beneficial uses as stipulated in the National Water Quality Standards for Malaysia (NWQS)(ANNEX). The WQI was derived using Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Ammoniacal Nitrogen (NH_3-N), Suspended Solids (SS) and pH.

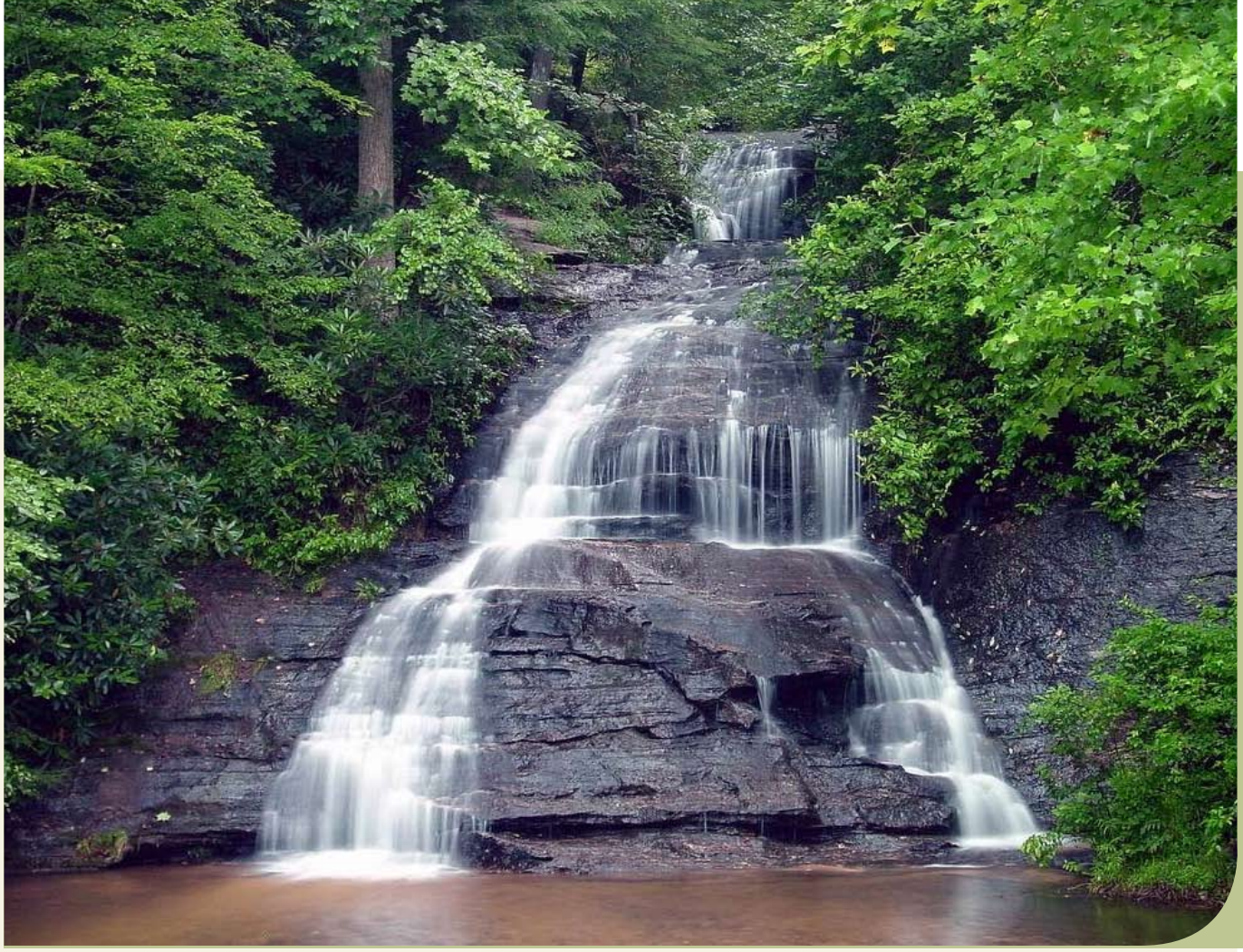
RIVER WATER QUALITY STATUS

In 2009, a total of 1,063 water quality monitoring stations located at 577 rivers were monitored. Out of these 1,063 monitoring stations, 578 (54%) were found to be clean, 378 (36%) slightly polluted and 107 (10%) polluted **(Tables 3.1, 3.2 and 3.3)**. The trend of the river water quality is shown in **Figure 3.1.** In 2009, there was a reduction in the number of clean rivers compared with 2008. There were 306 clean rivers in 2009 as compared with 334 in 2008 while the number of slightly polluted and polluted rivers increased from 197 to 217 and 48 to 54 respectively. The decrease in the number of clean rivers were attributed to an increase in the number of polluting sources such as sewage treatment plants, manufacturing industries and palm oil mills which contributed to a high pollution loading.

As in previous years, the major pollutants detected were BOD, NH_3-N and SS. High BOD can be attributed to untreated or partially treated sewage and discharges from agro-based and manufacturing industries. The main sources of NH_3-N were livestock farming and domestic sewage, whilst the sources for SS were earthworks and land clearing activities.

The DOE maintained 15 continuous water quality monitoring stations for early detection of pollution influx. For the period of January to December 2009, 34 incidences of distinctive pollution influx were observed as shown in **Table 3.4**.

Cumulative water quality data compiled from these 15 continuous water quality monitoring stations are presented in **Figures 3.2, 3.3, 3.4 and 3.5**. Based on the 90-percentile value, low DO levels were most frequent in Sungai Jinjang (41.0% saturation) followed by Sungai Putat (49.0% saturation) and Sungai Perai (54.0% saturation) **(Figure 3.2)**. High ammonium levels were recorded more frequently in Sungai Jinjang (17.0 mg/l) followed by Sungai Putat (12.0 mg/l) and Sungai Labu (5.8 mg/l) **(Figure 3.3)**. High turbidity level was most frequently detected at Sungai Rajang (1800 NTU), followed by Sungai Melaka (650 NTU) and Sungai Labu (600 NTU) **(Figure 3.4)**. Meanwhile pH value of 6.4 was recorded at Sungai Selangor, pH 6.5 at Sungai Terengganu and pH 6.6 at Sungai Perai **(Figure 3.5)**.



Picturesque view of a cascading waterfall amidst greenery

RIVER WATER POLLUTION SOURCES

Figures 3.6, 3.7 and 3.8 show the status of river water quality in terms of BOD, NH_3-N and SS. Based on BOD level, 152 rivers were categorized as polluted, 238 rivers as slightly polluted and 187 rivers as clean **(Figure 3.6)**. Based on NH_3-N, 183 rivers were categorized as polluted, 167 rivers as slightly polluted and 227 rivers as clean **(Figure 3.7)**. Meanwhile, 186 rivers were categorized as polluted by SS, 100 rivers as slightly polluted and 291 rivers as clean **(Figure 3.8)**.

Water samples were also analysed for heavy metals. From the 5,637 water samples analysed almost all samples complied with Class III of the National Water Quality Standards for arsenic (As), mercury (Hg), cadmium (Cd), chromium (Cr), lead (Pb) and zinc (Zn), except iron (Fe) where the compliance was 97 percent.

RIVER WATER STUDIES

River Pollution Prevention and Water Quality Improvement Programme had been implemented since the year 2001 under the 8th Malaysian Plan and continued in the 9th Malaysian Plan. Under this programme a number of detailed river studies have been carried out to determine the pollution sources and formulation of action plans. The river basins studied were Sungai Langat (Selangor), Sungai Segget/Tebrau (Johor), Sungai Melaka (Melaka), Batang Rajang (Sarawak), Rivers in Cameron Highlands (Pahang), Sungai Linggi (Negeri Sembilan), Sungai Sepetang (Perak) and Sungai Merbok (Kedah).

In 2009, the detailed study for Sungai Kinabatangan (Sabah) was completed while studies for Sungai Kuantan dan Sungai Sarawak are currently on-going and expected to be completed in mid-2010.

Table 3.1 Malaysia : Water Quality Status of Clean Rivers, 2009

STATE	RIVER BASIN	RIVER	NO. OF STATIONS	WQI		RIVER (2009)	
				2008	2009	CLASS	CATEGORY
PERLIS	PERLIS	JARUM	1	83	83	II	C
		JERNIH	2	87	81	II	C
		PELARIT	1	92	90	II	C
		WANG KELIAN	1	93	92	II	C
KEDAH	MERBOK	BUKIT MERAH	1	83	90	II	C
		TOK PAWANG	2	87	92	II	C
		TUPAH	2	94	95	I	C
	KISAP	KISAP	1	93	93	I	C
	ULU MELAKA	PETANG	1	93	92	II	C
		ULU MELAKA	1	88	86	II	C
	KEDAH	JANING	1	93	94	I	C
		PDG TERAP	4	85	86	II	C
		PEDU	1	90	90	II	C
		TEKAI	1	87	88	II	C
KEDAH/ P.PINANG	MUDA	CHEPIR	1	86	88	II	C
		KARANGAN	1	85	88	II	C
		KETIL	2	86	87	II	C
		MUDA	4	87	87	II	C
		PEGANG	1	93	93	I	C
		SEDIM	1	85	86	II	C
		TAWAR	1	88	90	II	C
P.PINANG	PINANG	AIR TERJUN	1	95	94	I	C
	KLUANG	ARA	2	80	84	II	C
	PERAI	KULIM	4	82	87	II	C
P.PINANG/ PERAK	KERIAN	KECHIL	2	79	83	II	C
		KERIAN	4	79	81	II	C
PERAK	PERAK	BATANG PADANG	3	84	85	II	C
		BIDOR	3	84	83	II	C
		CHEPOR	1	93	96	I	C
		CUAR	1	93	92	II	C
		KAMPAR	2	91	87	II	C
		KANGSAR	2	85	87	II	C
		KINJANG	1	94	90	II	C
		KUANG	1	83	84	II	C
		PELUS	2	89	88	II	C
		PERAK	8	86	89	II	C
		RAIA	2	90	87	II	C
		SUNGKAI	2	87	84	II	C
	RAJA HITAM	MANJONG	2	82	85	II	C
		NYIOR	1	93	93	I	C
	KURAU	ARA	2	90	94	I	C
	SEPETANG	BATU TEGOH	3	86	87	II	C
		JANA	2	86	87	II	C
		LIMAU	1	91	87	II	C
		TEMERLOH	2	92	91	II	C
		TRONG	1	90	92	II	C
		TUPAI	1	86	84	II	C
	BRUAS	BRUAS	3	82	87	II	C

Table 3.1 Malaysia : Water Quality Status of Clean Rivers, 2009 (continued)

STATE	RIVER BASIN	RIVER	NO. OF STATIONS	WQI		RIVER (2009)	
				2008	2009	CLASS	CATEGORY
PERAK		DANDANG	1	82	86	II	C
		ROTAN	2	89	93	I	C
PERAK/ SELANGOR	BERNAM	INKI	1	93	93	I	C
		SLIM	3	88	90	II	C
		TROLAK	2	91	93	I	C
SELANGOR	LANGAT	CHUAU	2	89	91	II	C
		LUI	1	92	91	II	C
	SELANGOR	BATANG KALI	1	91	91	II	C
		KANCHING	1	91	93	I	C
		KERLING	1	91	94	I	C
		SELANGOR	5	86	83	II	C
		SERENDAH	1	88	86	II	C
SELANGOR/ WPKL	KLANG	GOMBAK	3	82	82	II	C
		SEMELAH	1	83	86	II	C
N.SEMBILAN	LINGGI	BATANG PENAR	3	86	82	II	C
		CHEMBONG	1	85	81	II	C
		KUNDUR BESAR	1	85	84	II	C
		REMBAU	2	84	88	II	C
		SIPUT	2	86	84	II	C
MELAKA	MELAKA	BTG.MELAKA	2	86	82	II	C
		DURIAN TUNGGAL	1	85	83	II	C
		KEMUNTING	1	81	88	II	C
		KERU	1	88	88	II	C
		TAMPIN	3	84	87	II	C
	KESANG	CHOHONG	2	90	92	II	C
		KESANG	3	83	86	II	C
	DUYONG	GAPAM	1	93	92	II	C
JOHOR/ N.SEMBILAN	MUAR	AIR PANAS	1	92	94	I	C
		JUASSEH	2	87	89	II	C
		MEDA	1	86	83	II	C
		P. MENKUANG	1	83	83	II	C
		SEGAMAT	1	85	81	II	C
JOHOR	BATU PAHAT	BANTANG	1	93	96	I	C
		CHAAH	1	85	91	II	C
		LENIK	1	86	87	II	C
		MEREK	1	87	88	II	C
	BENUT	ULU BENUT	1	79	83	II	C
	ENDAU	ANK SG.SEMBERONG	1	84	83	II	C
		ENDAU	3	87	90	II	C
		JASIN	1	94	96	I	C
		KAHANG	1	85	87	II	C
		LENGGOR	1	82	84	II	C
		MAMAI	1	84	86	II	C
		PALOH	1	85	86	II	C
		SELAI	1	90	94	I	C
		SEMBERONG	5	84	83	II	C
		SINGOL	1	86	84	II	C
		TAMOK	1	88	92	II	C

Table 3.1 Malaysia : Water Quality Status of Clean Rivers, 2009 (continued)

STATE	RIVER BASIN	RIVER	NO. OF STATIONS	WQI		RIVER (2009)	
				2008	2009	CLASS	CATEGORY
JOHOR	JOHOR	ANAK SG. SAYONG	2	85	83	II	C
		BELITONG	1	87	89	II	C
		BUKIT BESAR	2	88	87	II	C
		CHEMANGAR	1	79	82	II	C
		JOHOR	4	85	85	II	C
		LAYANG	1	90	92	II	C
		LAYAU KIRI	1	90	87	II	C
		LINGGIU	1	88	90	II	C
		PANTI	1	86	83	II	C
		PAPAN	1	87	89	II	C
		PELEPAH	2	91	93	I	C
		PENGGELI	2	88	91	II	C
		REMIS	1	85	86	II	C
		SANTI	1	82	83	II	C
		SAYONG	4	85	88	II	C
		SELUYUT	1	85	82	II	C
		SEMANGAR	1	88	88	II	C
		SENING	1	79	91	II	C
		TELOR	1	87	92	II	C
		TEMOH	1	89	91	II	C
	SEDILI BESAR	AMBAT	1	84	87	II	C
		DOHOL	1	87	86	II	C
		SEDILI BESAR	5	81	83	II	C
		TEMUBOR KANAN	1	87	89	II	C
	SEDILI KECIL	ANAK SEDILI KECIL	1	78	81	II	C
		BAHAN	2	82	85	II	C
		SEDILI KECIL	3	81	84	II	C
	PALOI	PALOI	1	87	86	II	C
	MERSING	MERSING	2	87	87	II	C
PAHANG	ANAK ENDAU	ANAK ENDAU	2	87	84	II	C
	ROMPIN	AUR	1	89	89	II	C
		JEKATIH	2	87	85	II	C
		JERAM	1	91	92	II	C
		KEPASING	1	88	89	II	C
		KERATONG	3	86	82	II	C
		PONTIAN	1	90	90	II	C
		PUKIN	3	88	87	II	C
		ROMPIN	4	85	84	II	C
	MERCHONG	MERCHONG	2	86	84	II	C
	PAHANG	BELAYAR	1	92	92	II	C
		BENTONG	4	89	90	II	C
		BENUS	2	92	93	I	C
		BERA	3	85	83	II	C
		BERKAPOR	1	89	91	II	C
		BERTAM	3	81	82	II	C
		BILUT	1	87	87	II	C
		BURUNG	1	93	96	I	C
		CHINI	1	85	82	II	C

Table 3.1 Malaysia : Water Quality Status of Clean Rivers, 2009 (continued)

STATE	RIVER BASIN	RIVER	NO. OF STATIONS	WQI		RIVER (2009)	
				2008	2009	CLASS	CATEGORY
PAHANG		HABU	1	89	92	II	C
		JELAI	2	87	88	II	C
		JEMPOL	2	87	91	II	C
		JENGKA	2	84	83	II	C
		KELAU	2	88	90	II	C
		KERTAM	1	84	88	II	C
		KOYAN	1	89	89	II	C
		LENGGOK	1	90	88	II	C
		LEPAR	3	86	88	II	C
		LIPIS	3	89	90	II	C
		LUIT	1	89	90	II	C
		MARAN	1	81	89	II	C
		MENTIGA	2	86	86	II	C
		PAHANG	8	85	87	II	C
		PENJURING	1	93	94	I	C
		PERTANG	2	86	83	II	C
		PERTING	1	93	92	II	C
		RINGLET	1	85	82	II	C
		SEMANTAN	3	83	85	II	C
		T. PAYA BUNGOR	1	87	91	II	C
		TAHAN	1	91	88	II	C
		TANGLIR	1	89	92	II	C
		TASIK BERA	1	87	84	II	C
		TASIK CHINI	10	86	90	II	C
		TEKAL	1	83	83	II	C
		TEKAM	2	84	86	II	C
		TELANG	1	90	88	II	C
		TELEMONG	1	91	94	I	C
		TELOM	2	88	91	II	C
		TEMBELING	1	91	91	II	C
		TERANUM	1	85	93	I	C
		TERAS	1	88	91	II	C
		TERLA	1	93	95	I	C
		TRIANG	2	86	87	II	C
		TRINGKAP	1	85	85	II	C
	KUANTAN	BELAT	1	85	84	II	C
		CHARU	1	88	88	II	C
		KENAU	1	90	93	I	C
		KUANTAN	5	87	89	II	C
		PANDAN	1	87	88	II	C
	BEBAR	MERBA	1	82	81	II	C
TERENGGANU	CHUKAI	CHUKAI	1	88	86	II	C
		IBOK	2	85	87	II	C
	KEMAMAN	CHERUL	2	84	89	II	C
		KEMAMAN	3	85	88	II	C
		PERASING	1	85	87	II	C
	KERTIH	KERTIH	2	85	86	II	C
	PAKA	BESUL	1	87	90	II	C

Table 3.1 Malaysia : Water Quality Status of Clean Rivers, 2009 (continued)

STATE	RIVER BASIN	RIVER	NO. OF STATIONS	WQI		RIVER (2009)	
				2008	2009	CLASS	CATEGORY
TERENGGANU		PAKA	2	83	81	II	C
		RASAU	2	87	84	II	C
	DUNGUN	DUNGUN	4	88	87	II	C
		TELEMBOH	1	85	84	II	C
	MARANG	KERAK	1	82	85	II	C
		MARANG	1	86	88	II	C
		TEMALA	1	89	88	II	C
	TERENGGANU	BERANG	2	92	94	I	C
		PUEH	2	90	91	II	C
		TELEMONG	1	87	87	II	C
		TERENGGANU	3	86	85	II	C
	SETIU	CHALOK	2	71	87	II	C
		SETIU	2	85	91	II	C
		TAROM	1	90	82	II	C
	BESUT	BESUT	3	91	90	II	C
	KLUANG	KLUANG	1	87	85	II	C
KELANTAN	KEMASIN	SEMERAK	3	85	83	II	C
		ARING	1	85	90	II	C
		BELATOP	2	80	82	II	C
		BER	1	92	93	I	C
		BEROK	3	85	89	II	C
		BETIS	1	90	94	I	C
		CHIKU	1	89	83	II	C
		GALAS	5	87	90	II	C
		KELANTAN	3	85	85	II	C
		KELESA	1	88	91	II	C
		KERILLA	2	93	95	I	C
		KETIL	1	86	93	I	C
		LEBIR	4	86	88	II	C
		NAL	3	90	89	II	C
		NENGGIRI	3	85	90	II	C
		PEHI	1	87	88	II	C
		PERGAU	6	91	93	I	C
		RELAI	2	86	92	II	C
		SOKOR	1	86	86	II	C
		TUANG	1	89	94	I	C
	GOLOK	GOLOK	5	89	91	II	C
		LANAS	1	92	89	II	C
	PENGKALAN DATU	PENGKALAN DATU	3	79	83	II	C
SARAWAK	SARAWAK	KUAP	2	81	82	II	C
		SARAWAK	6	86	85	II	C
		SARAWAK KANAN	1	78	86	II	C
		SEMADANG	1	90	96	I	C
		TABUAN	1	68	81	II	C
	SIMILAJAU	SIMILAJAU	2	84	86	II	C
	LIMBANG	LIMBANG	5	81	87	II	C
	TRUSAN	TRUSAN	1	88	87	II	C
	LAWAS	LAWAS	3	90	86	II	C

Table 3.1 Malaysia : Water Quality Status of Clean Rivers, 2009 (continued)

STATE	RIVER BASIN	RIVER	NO. OF STATIONS	WQI		RIVER (2009)	
				2008	2009	CLASS	CATEGORY
SARAWAK	LUPAR	AI	2	87	91	II	C
		SEKERANG	1	79	89	II	C
		SETERAP	1	77	82	II	C
		UNDUP	1	85	82	II	C
	RAJANG	BALOI	1	81	81	II	C
		BINATANG	1	89	88	II	C
		JULAU	1	87	86	II	C
		KANOWIT	1	86	86	II	C
	OYA	OYA	3	78	83	II	C
	TATAU	TATAU	1	79	83	II	C
	SADONG	TARAT	1	88	88	II	C
	SIBUTI	KEJAPIL	1	84	83	II	C
	MIRI	PADANG LIKU	1	87	87	II	C
SABAH	LIKAS	INANAM	3	84	83	II	C
		MENGGATAL	2	91	87	II	C
	KINABATANGAN	KARAMUAK	1	85	92	II	C
		KOYAH	1	84	84	II	C
	KALUMPANG	KALUMPANG	3	88	85	II	C
	MENGGALONG	MENGGALONG	2	90	89	II	C
	LAKUTAN	LAKUTAN	1	91	90	II	C
	LINGKUNGAN	BUKAU	1	89	88	II	C
		LINGKUNGAN	1	93	91	II	C
	PADAS	BUNSIT	1	91	96	I	C
		LIAWAN	1	90	96	I	C
		PANGATAN	1	85	88	II	C
		PEGALAN	3	87	89	II	C
		TANDULU	1	92	96	I	C
	MEMBAKUT	MEMBAKUT	1	86	83	II	C
	KIMANIS	KIMANIS	1	86	86	II	C
	BONGAWAN	BONGAWAN	1	86	85	II	C
	PAPAR	PAPAR	3	89	90	II	C
	MOYOG	MOYOG	4	91	91	II	C
	TUARAN	DAMIT	2	85	90	II	C
		SONG SAI	1	88	92	II	C
		TUARAN	2	91	92	II	C
	KEDAMAIAN	KEDAMAIAN	1	93	95	I	C
		TEMPASUK	2	92	92	II	C
		WARIU	1	92	94	I	C
	TENGHILAN	TENGHILAN	1	90	91	II	C
	BINGKONGAN	BANDAU	1	92	94	I	C
		BINGKONGAN	2	92	93	I	C
		MENGGARIS	2	92	92	II	C
		TANDEK	1	88	88	II	C
	BENGKOKA	BENGKOKA	2	84	89	II	C
	PAITAN	PAITAN	1	87	88	II	C
	SUGUT	BONGKUD	1	93	96	I	C
		LOHAN	1	91	94	I	C
		MERALI	1	93	95	I	C

Table 3.1 Malaysia : Water Quality Status of Clean Rivers, 2009 (continued)

STATE	RIVER BASIN	RIVER	NO. OF STATIONS	WQI		RIVER (2009)	
				2008	2009	CLASS	CATEGORY
SABAH		SUGUT	3	91	92	II	C
	LABOK	KINIPIR	2	89	91	II	C
		LABOK	1	86	90	II	C
		LIWAGU	2	87	88	II	C
		MALIAU	1	93	95	I	C
		TUNGUD	1	88	89	II	C
	SAPI	SAPI	3	81	82	II	C
		SUALONG	1	92	92	II	C
	MOUNAD	MOUNAD	2	83	86	II	C
	TUNGKU	TUNGKU	2	88	85	II	C
	SILABUKAN	SILABUKAN	2	81	85	II	C
	TINGKAYU	TINGKAYU	2	84	83	II	C
	TAWAU	TAWAU	4	88	86	II	C
	APAS	APAS	1	86	89	II	C
	BALUNG	BALUNG	1	87	86	II	C
	MEROTAI	MEROTAI	3	88	87	II	C
	BRANTIAN	BRANTIAN	1	84	86	II	C
	TELIPOK	TELIPOK	2	80	82	II	C

Table 3.2 Malaysia : Water Quality Status of Slightly Polluted Rivers, 2009

STATE	RIVER BASIN	RIVER	NO. OF STATIONS	WQI		RIVER (2009)	
				2008	2009	CLASS	CATEGORY
PERLIS	PERLIS	KOK MAK	1	73	70	III	SP
		NGULANG	1	76	75	III	SP
		PERLIS	1	71	72	III	SP
		SERAI	1	78	75	III	SP
KEDAH	KEDAH	KEDAH	1	71	65	III	SP
		PENDANG	1	78	80	II	SP
	KUAH	KUAH	1	82	73	III	SP
	MERBOK	BAKAR ARANG	1	69	68	III	SP
		BONGKOK	1	67	75	III	SP
		MERBOK	1	73	76	III	SP
KEDAH/ P.PINANG	MUDA	JERUNG	2	72	74	III	SP
P.PINANG	PINANG	AIR ITAM	5	59	64	III	SP
		PINANG	1	61	64	III	SP
	JURU	JURU	2	53	60	III	SP
		KILANG UBI	5	69	70	III	SP
		PASIR	1	60	63	III	SP
		PMTG RAWA	1	62	69	III	SP
	KLUANG	KLUANG	1	62	65	III	SP
		RELAU	1	66	73	III	SP
	PERAI	JARAK	5	72	74	III	SP
		KELADI	1	78	80	II	SP
		KUBANG SEMANG	1	62	63	III	SP
		PERAI	2	65	65	III	SP
		PERTAMA	1	57	61	III	SP
		SELUANG BAWAH	2	57	60	III	SP
	BAYAN LEPAS	BAYAN LEPAS	1	61	69	III	SP
		TIRAM	2	70	69	III	SP
	JAWI	JUNJONG	3	73	69	III	SP
		MACHANG BUBOK	1	77	76	III	SP
P.PINANG/ PERAK	KERIAN	SELAMA	2	72	74	III	SP
		SERDANG	1	69	71	III	SP
PERAK	RAJA HITAM	DERHAKA	2	64	66	III	SP
		RAJA HITAM	3	72	73	III	SP
	KURAU	KURAU	4	79	80	II	SP
	SEPETANG	LARUT	1	75	79	II	SP
		MALAI	1	67	60	III	SP
		SEPETANG	2	77	77	II	SP
	WANGI	DERALIK	2	69	62	III	SP
		WANGI	2	77	70	III	SP
	PERAK	CHENDERIANG	2	84	79	II	SP
		KEPAYANG	2	67	73	III	SP
		KERDAH	2	74	70	III	SP
		KINTA	8	77	76	III	SP
		KLAH	2	85	79	II	SP
		KLIAN BARU	2	76	74	III	SP
		NYAMOK	1	72	73	III	SP
		PARI	2	71	70	III	SP

Table 3.2 Malaysia : Water Quality Status of Slightly Polluted Rivers, 2009 (continued)

STATE	RIVER BASIN	RIVER	NO. OF STATIONS	WQI		RIVER (2009)	
				2008	2009	CLASS	CATEGORY
PERAK		PINJI	2	69	70	III	SP
		SEROKAI	2	64	71	III	SP
		SINTANG	1	61	70	III	SP
		SUNGKAI MATI	2	81	61	III	SP
		TUMBOH	1	74	72	III	SP
PERAK/ SELANGOR	BERNAM	BERNAM	7	81	78	II	SP
SELANGOR	LANGAT	ANAK CHUAU	1	78	75	III	SP
		BALAK	1	61	62	III	SP
		BATANG BENAR	2	66	69	III	SP
		BATANG LABU	2	78	72	III	SP
		BERANANG	1	84	78	II	SP
		BUAN	1	77	76	III	SP
		JIJAN	1	87	77	II	SP
		LANGAT	8	73	71	III	SP
		LIMAU MANIS	1	67	71	III	SP
		PAJAM	1	77	72	III	SP
		RINCHING	1	74	60	III	SP
		SEMENYIH	3	82	77	II	SP
	SEPANG	SEPANG	3	76	75	III	SP
	TENGI	TENGI	3	80	77	II	SP
	SELANGOR	AIR HITAM	1	75	68	III	SP
		RAWANG	1	78	72	III	SP
		SEMBAH	1	78	68	III	SP
SELANGOR/ WPKL	KLANG	AMPANG	1	64	69	III	SP
		BATU	3	72	71	III	SP
		KLANG	10	63	60	III	SP
		KUYOH	1	64	63	III	SP
N.SEMBILAN	LUKUT	LUKUT	1	77	72	III	SP
	LINGGI	KAYU ARA	1	72	68	III	SP
		KEPAYONG	1	77	78	II	SP
		LINGGI	6	75	75	III	SP
		PAROI	1	75	78	II	SP
		PEDAS	1	82	79	II	SP
		SENAWANG	1	65	67	III	SP
		SIMIN	1	77	73	III	SP
		SIMPANG EMPAT	1	81	78	II	SP
		TEMIANG	2	67	68	III	SP
MELAKA	TUANG	BARU	1	71	69	III	SP
	SERI MELAKA	SERI MELAKA	1	68	67	III	SP
	MELAKA	MELAKA	9	70	70	III	SP
		PUTAT	2	61	60	III	SP
		REMBIA	2	70	70	III	SP
	KESANG	TANGKAK	1	66	63	III	SP
	DUYONG	DUYONG	3	77	78	II	SP
JOHOR/ N.SEMBILAN	MUAR	GEMAS	1	85	78	II	SP
		GEMENCHEH	2	82	79	II	SP
		LABIS	3	81	80	II	SP

Table 3.2 Malaysia : Water Quality Status of Slightly Polluted Rivers, 2009 (continued)

STATE	RIVER BASIN	RIVER	NO. OF STATIONS	WQI		RIVER (2009)	
				2008	2009	CLASS	CATEGORY
JOHOR/ N.SEMBILAN		MERBUDU	1	78	74	III	SP
		MERLIMAU	1	75	66	III	SP
		MUAR	17	83	79	II	SP
		PALONG	2	81	79	II	SP
		SENARUT	1	76	66	III	SP
		SEROM	1	74	70	III	SP
		SPG. LOI	1	76	77	II	SP
		TENANG	1	80	68	III	SP
JOHOR	BATU PAHAT	AMRAN	1	79	68	III	SP
		BATU PAHAT	1	65	60	III	SP
		BEKOK	5	82	80	II	SP
		BERLIAN	1	75	69	III	SP
		MERPO	1	83	74	III	SP
		SEMBERONG	2	72	64	III	SP
		SIMPANG KIRI	3	70	66	III	SP
	RAMBAH	RAMBAH	2	58	63	III	SP
	BENUT	BENUT	4	77	76	III	SP
		PARIT HJ. YASSIN	1	85	80	II	SP
		PINGGAN	1	71	65	III	SP
	PONTIAN BESAR	AIR HITAM	1	70	71	III	SP
		PONTIAN BESAR	5	70	67	III	SP
	PONTIAN KECIL	PONTIAN KECIL	2	78	75	III	SP
	SKUDAI	MELANA	2	65	64	III	SP
		SKUDAI	9	70	64	III	SP
	SANGLANG	SANGLANG	1	61	61	III	SP
	PULAI	PULAI	2	80	79	II	SP
		ULU CHOH	1	68	67	III	SP
	KIM-KIM	KIM-KIM	2	67	75	III	SP
	JEMALUANG	JEMALUANG	2	83	80	II	SP
	ENDAU	DENGAR	1	73	63	III	SP
		JEBONG	1	76	72	III	SP
		MELATAI	1	62	61	III	SP
		MENGKIBOL	3	74	71	III	SP
		PAMOL	1	69	70	III	SP
	TEBRAU	TEBRAU	5	73	69	III	SP
	JOHOR	BERANGAN	1	68	63	III	SP
		LEBAM	1	81	75	III	SP
		SEBOL	1	86	78	II	SP
		SEMENCHU	1	81	74	III	SP
		TIRAM	4	80	74	III	SP
	SEDILI BESAR	MUPUR	1	68	75	III	SP
		PASIR PANJANG	1	74	76	III	SP
PAHANG	BEBAR	BEBAR	2	82	75	III	SP
		SERAI	2	78	72	III	SP
	BALOK	BALOK	2	73	76	III	SP
		PANJANG	1	78	74	III	SP
		YIOR	1	71	65	III	SP
	CHERATING	CHERATING	1	80	80	II	SP

Table 3.2 Malaysia : Water Quality Status of Slightly Polluted Rivers, 2009 (continued)

STATE	RIVER BASIN	RIVER	NO. OF STATIONS	WQI		RIVER (2009)	
				2008	2009	CLASS	CATEGORY
PAHANG	TONGGOK	TONGGOK	2	79	77	II	SP
	ROMPIN	BAKAR	1	78	72	III	SP
	PAHANG	ANAK SG. LEPAR	1	76	68	III	SP
		BATU	1	73	68	III	SP
		KUNDANG	1	78	76	III	SP
		SERTING	5	81	75	III	SP
	KUANTAN	GALING BESAR	1	46	60	III	SP
		GALING KECIL	1	59	69	III	SP
		PINANG	1	81	80	II	SP
		REMAN	1	66	73	III	SP
		RIAU	1	77	74	III	SP
		TALAM	1	81	72	III	SP
TERENGGANU	KEMAMAN	NERAM	1	63	77	II	SP
	PAKA	RENGAT	1	75	80	II	SP
	TERENGGANU	NERUS	4	77	66	III	SP
	BESUT	JERTIH	1	86	73	III	SP
TERENGGANU	CHUKAI	BUNGKUS	1	81	77	II	SP
		RUANG	2	69	70	III	SP
	IBAI	IBAI	3	78	75	III	SP
	MERCHANG	LANDAS	1	51	67	III	SP
		MERCHANG	1	71	73	III	SP
	MERANG	MERANG	1	71	69	III	SP
KELANTAN	KEMASIN	KEMASIN	2	81	80	II	SP
	GOLOK	TASIK GARU	1	75	78	II	SP
	PENGKALAN CHEPA	ALOR B	1	61	65	III	SP
		KELADI	1	82	76	III	SP
		PENGKALAN CHEPA	2	77	78	II	SP
		RAJA GALI	1	73	78	II	SP
SARAWAK	KAYAN	KAYAN	3	82	76	III	SP
	SEMUNSAM	SEMUNSAM	1	86	80	II	SP
	BALINGIAN	BALINGIAN	2	81	80	II	SP
	NIAH	NIAH	2	82	80	II	SP
		SEKALOH	2	79	70	III	SP
	SADONG	KARANGAN	2	72	61	III	SP
		SADONG	4	79	71	III	SP
	SARIBAS	LAYAR	2	82	79	II	SP
		SARIBAS	1	70	73	III	SP
	KERIAN	KERIAN	2	78	71	III	SP
		SEBLAK	1	79	77	II	SP
	MUKAH	MUKAH	4	77	75	III	SP
	KEMENA	KEMENA	4	78	77	II	SP
		SIBIU	1	81	73	III	SP
	SUAI	SUAI	1	79	78	II	SP
	SIBUTI	KABULOH	2	68	64	III	SP
		SATAP	1	80	79	II	SP
		SIBUTI	2	81	79	II	SP
	MIRI	DALAM	1	72	60	III	SP
		LUTONG	2	67	70	III	SP

Table 3.2 Malaysia : Water Quality Status of Slightly Polluted Rivers, 2009 (continued)

STATE	RIVER BASIN	RIVER	NO. OF STATIONS	WQI		RIVER (2009)	
				2008	2009	CLASS	CATEGORY
SARAWAK		MIRI	2	57	65	III	SP
	BARAM	BARAM	4	79	77	II	SP
		TUTUH	1	77	80	II	SP
	SARAWAK	KELANTAN	1	63	66	III	SP
		MAONG KIRI	1	65	71	III	SP
		SAMARAHAN	2	78	75	III	SP
		SARAWAK KIRI	1	86	79	II	SP
		SEMENGGOH	1	75	78	II	SP
	LUPAR	LUPAR	3	75	73	III	SP
	RAJANG	MERADONG	1	74	80	II	SP
		RAJANG	11	78	79	II	SP
		SALIM	1	73	80	II	SP
		SARIKEI	2	82	80	II	SP
SABAH	PADAS	PADAS	3	84	77	II	SP
	SEGAMA	SEGAMA	3	85	80	II	SP
	UMAS-UMAS	UMAS-UMAS	1	82	77	II	SP
	KALABAKAN	KALABAKAN	3	82	75	III	SP
	SEMBULAN	SEMBULAN	2	67	68	III	SP
	LIKAS	DARAU	1	75	75	III	SP
		LIKAS	2	63	65	III	SP
	SEGALIUD	SEGALIUD	2	79	78	II	SP
	KINABATANGAN	KINABATANGAN	4	78	78	II	SP
		LEEPANG	1	80	76	III	SP
		MENANGGUL	1	76	72	III	SP
		PIN	1	79	78	II	SP
		TAKALA	1	72	77	II	SP
	KALUMPANG	PANG BURONG 2	1	64	63	III	SP

Table 3.3 Malaysia : Water Quality Status of Polluted Rivers, 2009

STATE	RIVER BASIN	RIVER	NO. OF STATIONS	WQI		RIVER (2009)	
				2008	2009	CLASS	CATEGORY
KEDAH	MERBOK	KOROK	1	57	45	IV	P
		PETANI	1	53	58	III	P
P.PINANG	PINANG	DONDANG	3	49	51	IV	P
		JELUTONG	1	38	39	IV	P
	JURU	ARA	1	58	49	IV	P
		RAMBAI	2	55	53	III	P
	PERAI	AIR MELINTAS	1	40	50	IV	P
		KEREH	2	50	57	III	P
		SELUANG	1	54	56	III	P
P.PINANG	JAWI	CHEMPEDAK	1	43	44	IV	P
		JAWI	1	57	52	III	P
		TENGAH	1	46	36	IV	P
PERAK	PERAK	SELUANG	1	59	52	III	P
	SEPETANG	LIDIN	1	69	58	III	P
SELANGOR	LANGAT	BATANG NILAI	2	54	53	III	P
	SEPANG	RAMBAI	1	62	54	III	P
	SELANGOR	KUNDANG	1	72	57	III	P
	BULOH	BULOH	5	67	58	III	P
SELANGOR/ WPKL	KLANG	BUNOS	1	55	47	IV	P
		DAMANSARA	3	64	59	III	P
		JINJANG	2	52	58	III	P
		KERAYONG	2	51	48	IV	P
		KEROH	2	51	50	IV	P
		PENCHALA	1	46	42	IV	P
MELAKA	TUANG	TUANG	1	48	38	IV	P
	SERI MELAKA	AIR SALAK	1	66	58	III	P
	KESANG	CHIN-CHIN	1	55	54	III	P
	MERLIMAU	MERLIMAU	4	60	54	III	P
JOHOR/ N.SEMBILAN	MUAR	KELAMAH	1	64	55	III	P
		SARANG BUAYA	1	67	53	III	P
JOHOR	BATU PAHAT	SIMPANG KANAN	2	66	58	III	P
	PONTIAN BESAR	AYER MERAH	1	42	35	IV	P
	ENDAU	LENGA	1	63	56	III	P
	JOHOR	SERAI	1	59	57	III	P
	AIR BALOI	AIR BALOI	3	51	48	IV	P
	SEGGET	SEGGET	5	52	50	IV	P
	TEBRAU	BALA	1	54	56	III	P
		PANDAN	1	50	51	IV	P
		PLENTONG	1	47	42	IV	P
		SEBULUNG	1	48	44	IV	P
		SENGKUANG	1	49	31	IV	P
		TAMPOI	1	47	41	IV	P
	DANGA	DANGA	2	52	52	III	P
	KAW. PASIR GUDANG	BULUH	1	33	36	IV	P
		LATOH	1	53	57	III	P
		MASAI	1	56	57	III	P
		PEREMBI	1	52	46	IV	P
		TUKANG BATU	1	26	36	IV	P

Table 3.3 Malaysia : Water Quality Status of Polluted Rivers, 2009 (continued)

STATE	RIVER BASIN	RIVER	NO. OF STATIONS	WQI		RIVER (2009)	
				2008	2009	CLASS	CATEGORY
JOHOR	KEMPAS	KEMPAS	2	63	57	III	P
PAHANG	ROMPIN	SEPAYANG	1	68	56	III	P
TERENGGANU	KEMAMAN	RANSAN	2	75	58	III	P
KELANTAN	PENGKALAN CHEPA	ALOR LINTAH	1	58	55	III	P
SARAWAK	MIRI	ADONG	1	53	56	III	P
SABAH	KALUMPANG	PANG BURONG 1	1	66	49	IV	P

Table 3.4 Malaysia : Pollution Influx Observed at Continuous Water Quality Station

Station	Date	Parameter	Pollution Sources
Batang Benar	28-Jan-09	pH: 4.95	Sewage or latex based industry or industrial discharge
Melaka	30-Jan-09	NH_4: 1.56 mg/l	Sewage or latex based industry
Melaka	20-Feb-09	pH: 10.30	Sewage or latex based industry
Batang Benar	24-Feb-09	pH: 10.61	Sewage or latex based industry or industrial discharge
Batang Benar	6-Mar-09	pH: 8.97	Sewage or latex based industry or industrial discharge
Batang Benar	21-Mar-09	NH_4: 4.28 mg/l	Sewage or latex based industry or industrial discharge
Batang Benar	23-Mar-09	NH_4: 4.32 mg/l	Sewage or latex based industry or industrial discharge
Batang Benar	26-Mar-09	pH: 8.89	Sewage or latex based industry or industrial discharge
Batang Benar	31-Mar-09	pH: 9.12	Sewage or latex based industry or industrial discharge
Batang Benar	10-Apr-09	NH_4: 3.42 mg/l	Sewage or latex based industry or industrial discharge
Labu	28-Apr-09	NH_4: 4.01 mg/l	Sewage or latex based industry or industrial discharge
Labu	2-May-09	NH_4: 4.68 mg/l	Sewage or latex based industry or industrial discharge
Melaka	25-May-09	pH: 8.44	Sewage or latex based industry
Batang Benar	28-May-09	pH: 9.17	Sewage or latex based industry or industrial discharge
Batang Benar	1-Jun-09	pH: 8.64	Sewage or latex based industry or industrial discharge
Melaka	11-Jun-09	pH: 10.76	Sewage or latex based industry
Batang Benar	15-Jul-09	pH: 9.71	Sewage or latex based industry or industrial discharge
Batang Benar	19-Jul-09	NH_4: 5.56 mg/l	Sewage or latex based industry or industrial discharge
Batang Benar	10-Aug-09	pH: 9.82	Sewage or latex based industry or industrial discharge
Labu	10-Aug-09	NH_4: 20.32 mg/l	Sewage or latex based industry or industrial discharge
Melaka	12-Aug-09	pH: 9.33	Sewage or latex based industry
Labu	17-Aug-09	NH_4: 14.83 mg/l	Sewage or latex based industry or industrial discharge
Batang Benar	17-Aug-09	pH: 8.77	Sewage or latex based industry or industrial discharge
Batang Benar	22-Aug-09	pH: 8.92	Sewage or latex based industry or industrial discharge
Batang Benar	6-Sep-09	pH: 8.44	Sewage or latex based industry or industrial discharge
Labu	15-Sep-09	NH_4: 12.98 mg/l	Sewage or latex based industry or industrial discharge
Batang Benar	14-Oct-09	pH: 10.11	Sewage or latex based industry or industrial discharge
Melaka	24-Oct-09	pH: 8.29	Sewage or latex based industry
Melaka	27-Oct-09	pH: 9.22	Sewage or latex based industry
Keratong	20-Nov-09	NH_4: 2.64 mg/l	Sewage or latex based industry
Batang Benar	5-Dec-09	pH: 8.40	Sewage or latex based industry or industrial discharge
Melaka	8-Dec-09	pH: 8.01	Sewage or latex based industry or industrial discharge
Melaka	14-Dec-09	pH: 8.28	Sewage or latex based industry or industrial discharge

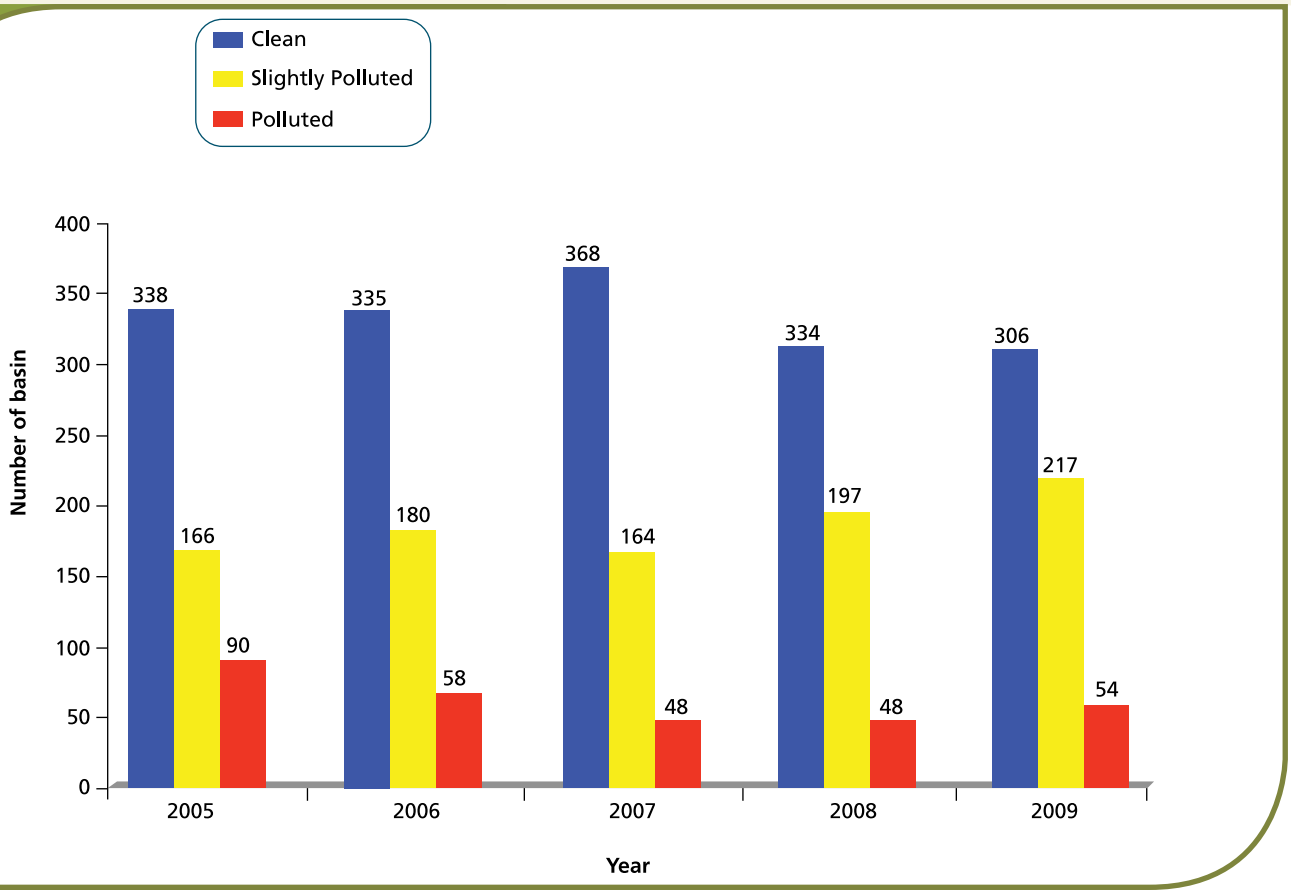


Figure 3.1Malaysia : River Water Quality Trend (2005 - 2009)

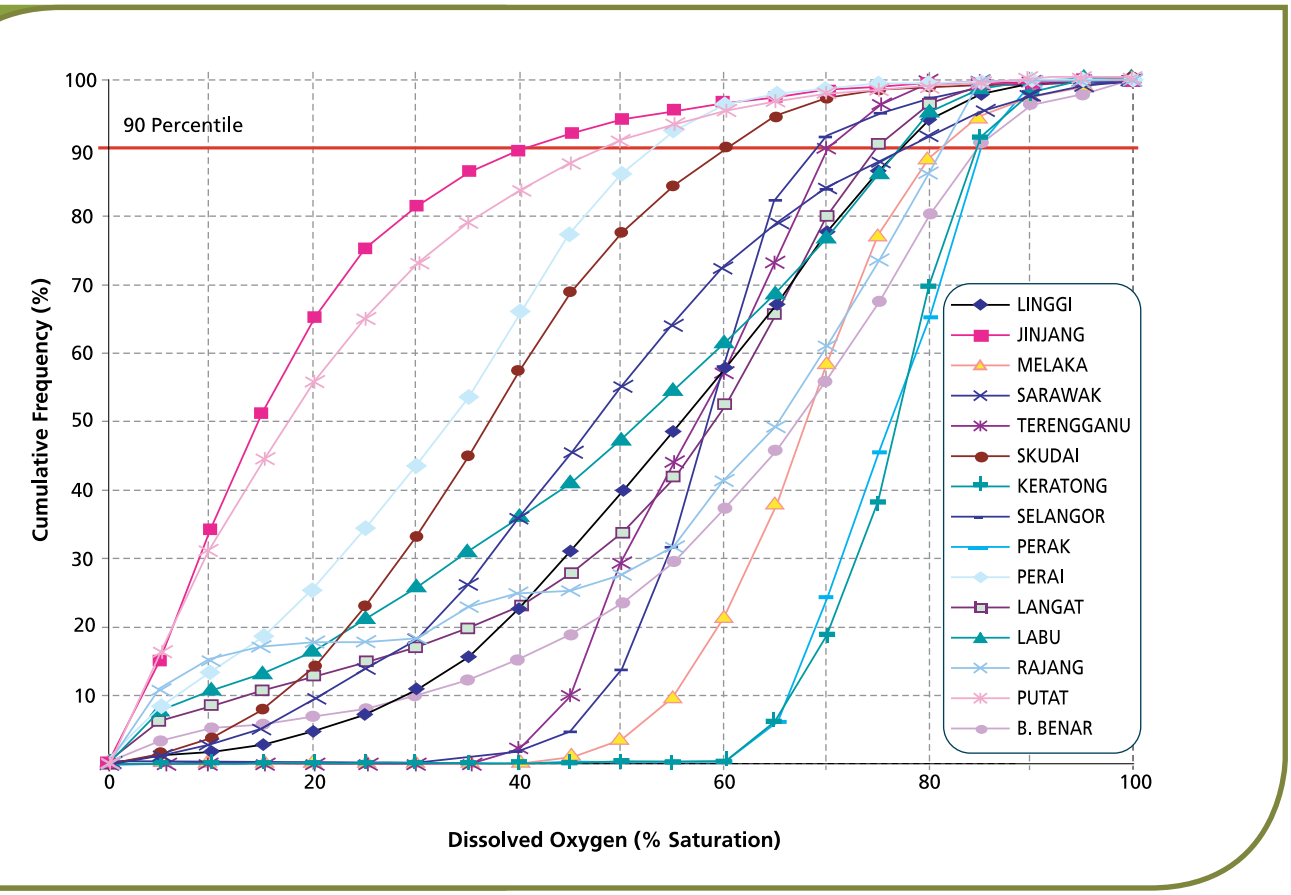


Figure 3.2 Malaysia : Comparison of Cumulative Frequency for 15 CWQM Stations - Dissolved Oxygen : 1st January - 31st December 2009

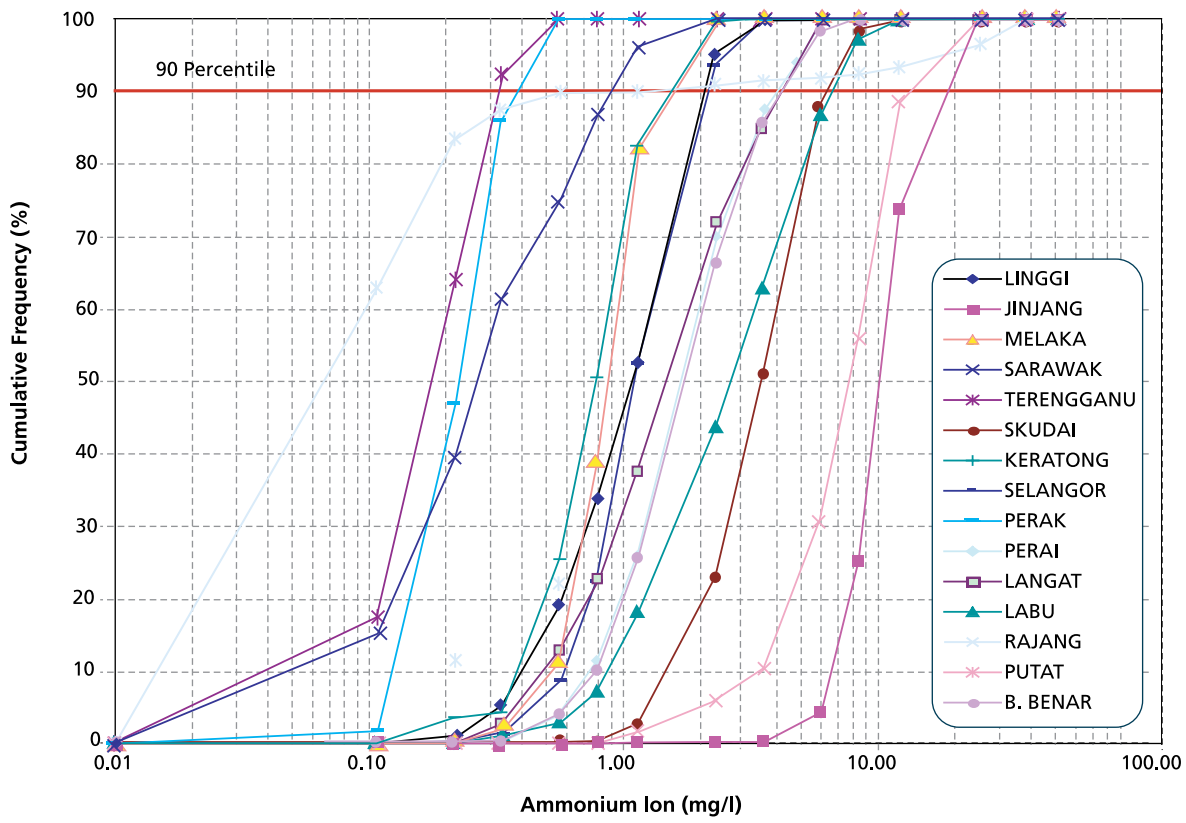


Figure 3.3 Malaysia : Comparison of Cumulative Frequency for 15 CWQM Stations - Ammonium Ion Concentration : 1st January - 31st December 2009

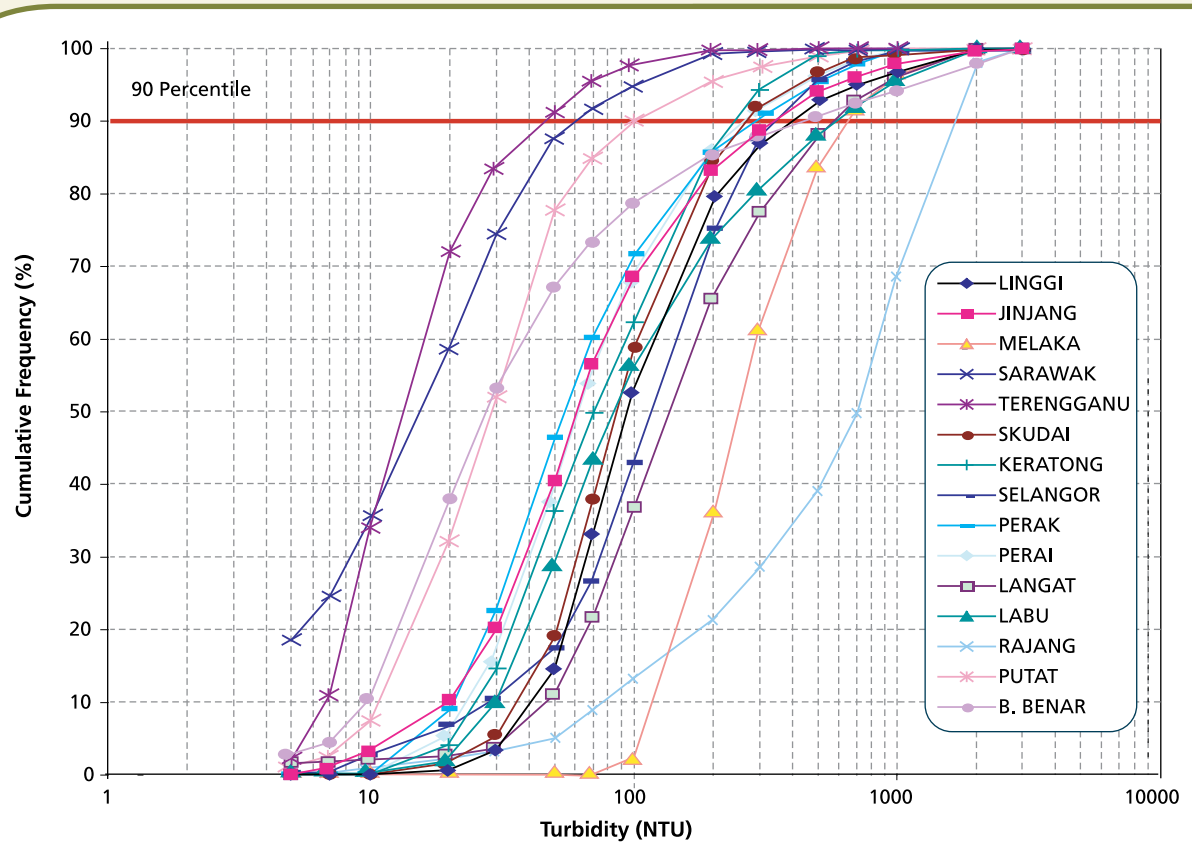


Figure 3.4 Malaysia : Comparison of Cumulative Frequency for 15 CWQM Stations - Turbidity : 1st January - 31st December 2009

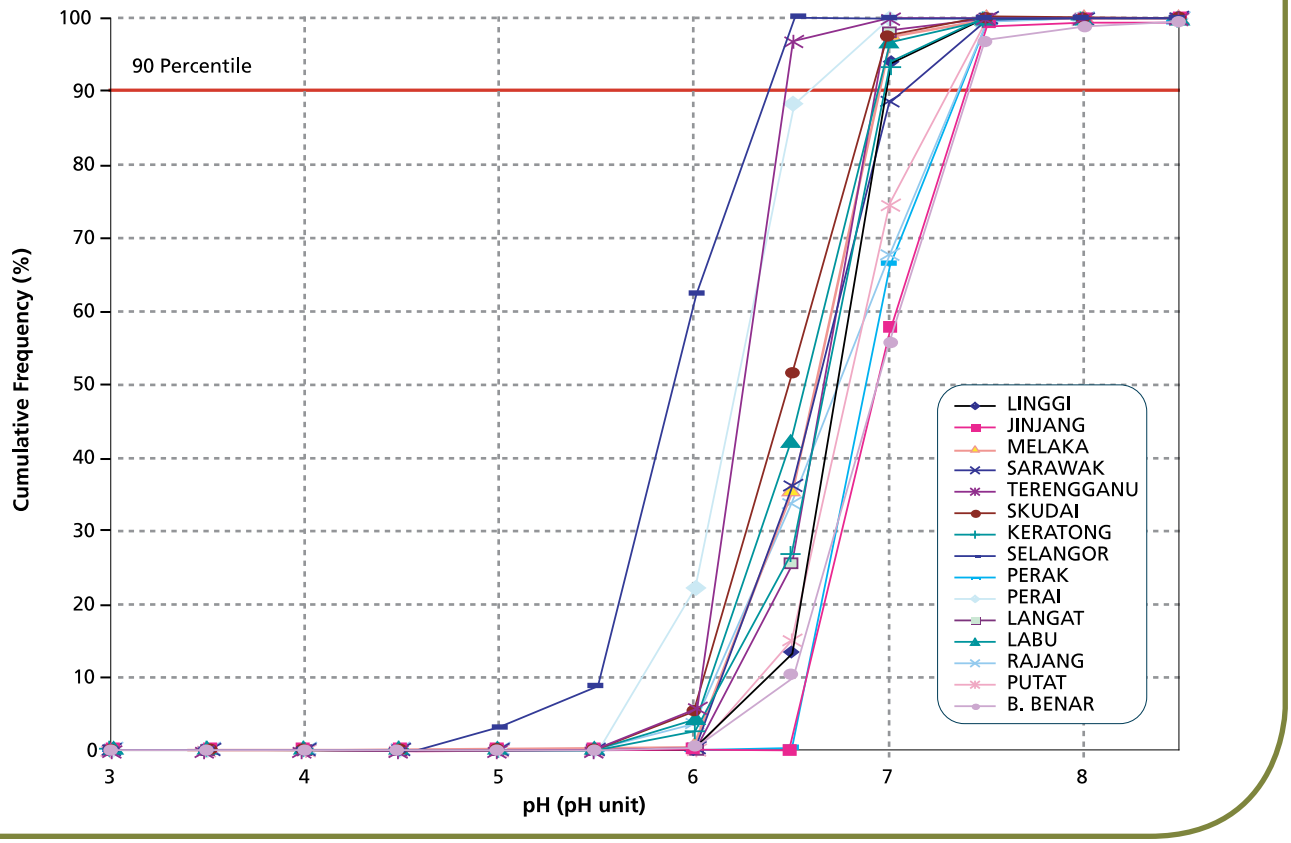


Figure 3.5 Malaysia : Comparison of Cumulative Frequency for 15 CWQM Stations - pH Level : 1st January - 31st December 2009

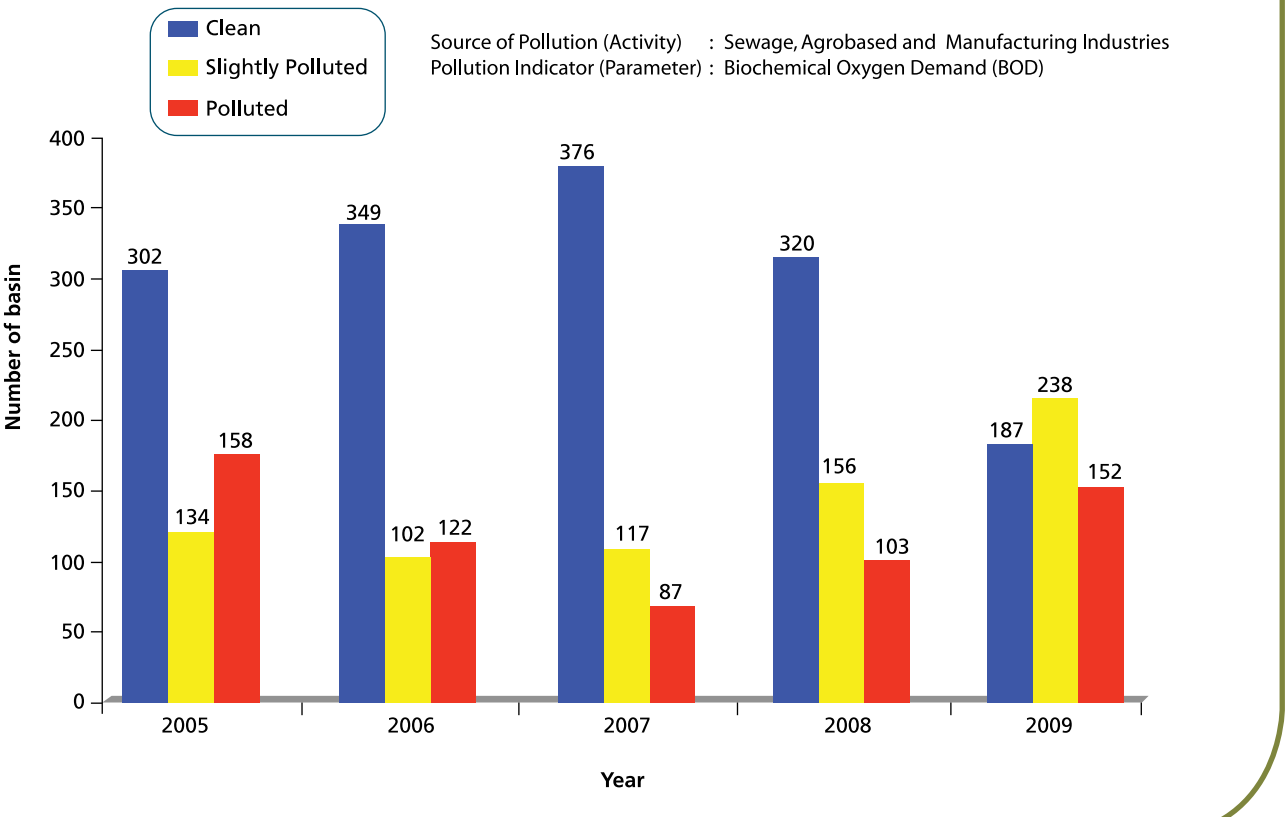


Figure 3.6 Malaysia : River Water Quality Trend based on BOD sub-index (2005 - 2009)

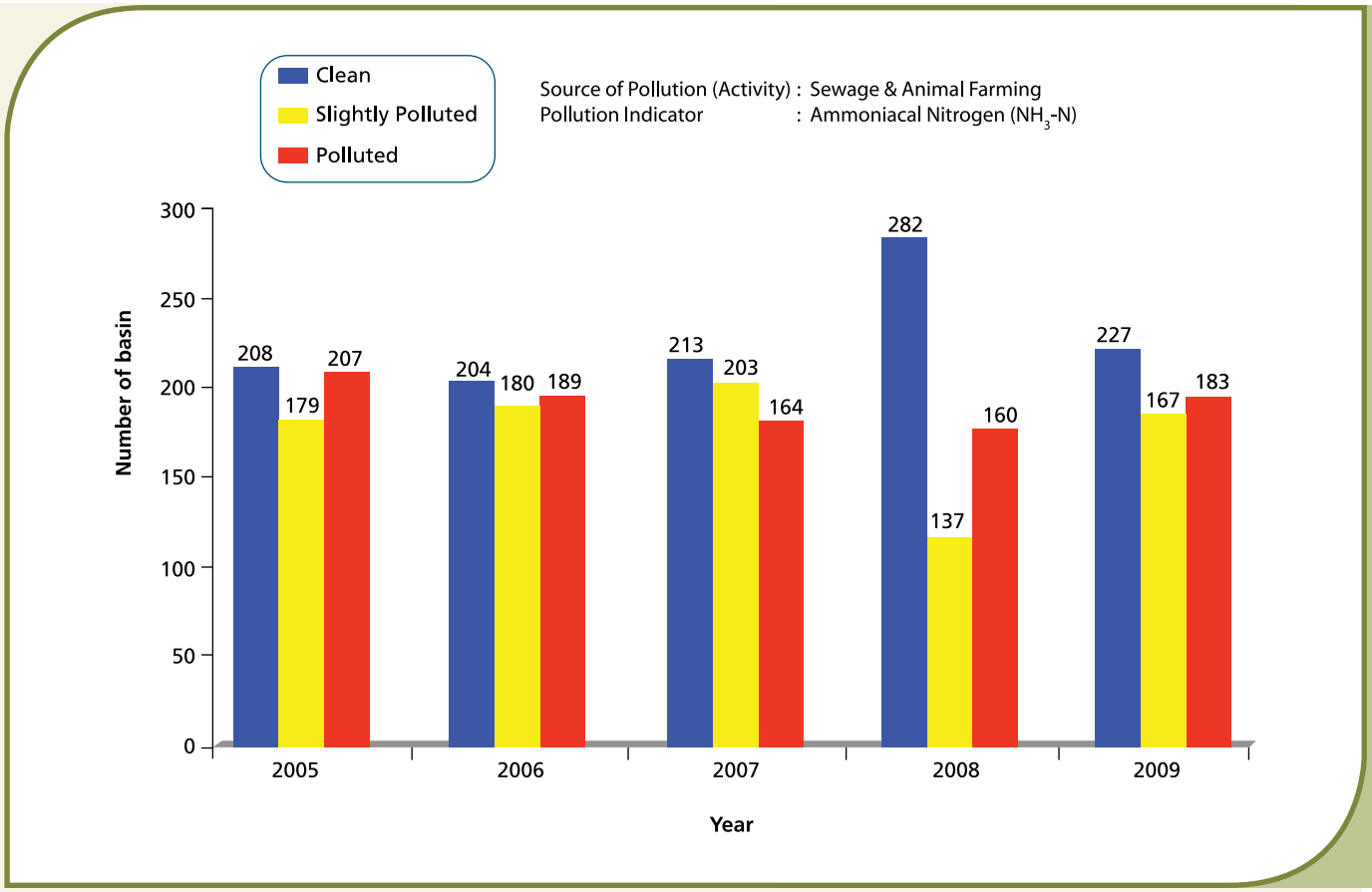


Figure 3.7 Malaysia: River Water Quality Trend based on AN sub-index (2005 - 2009)

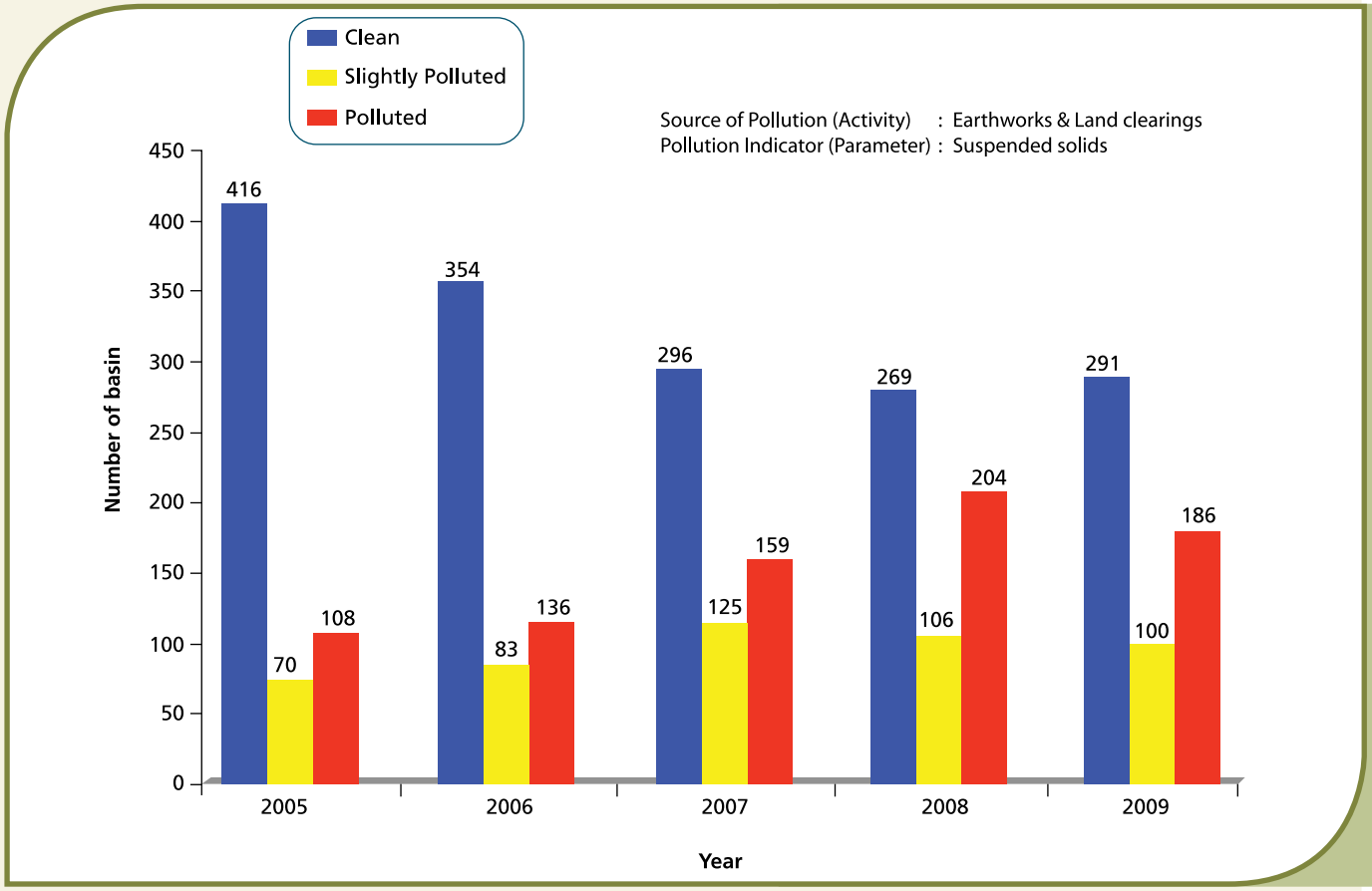
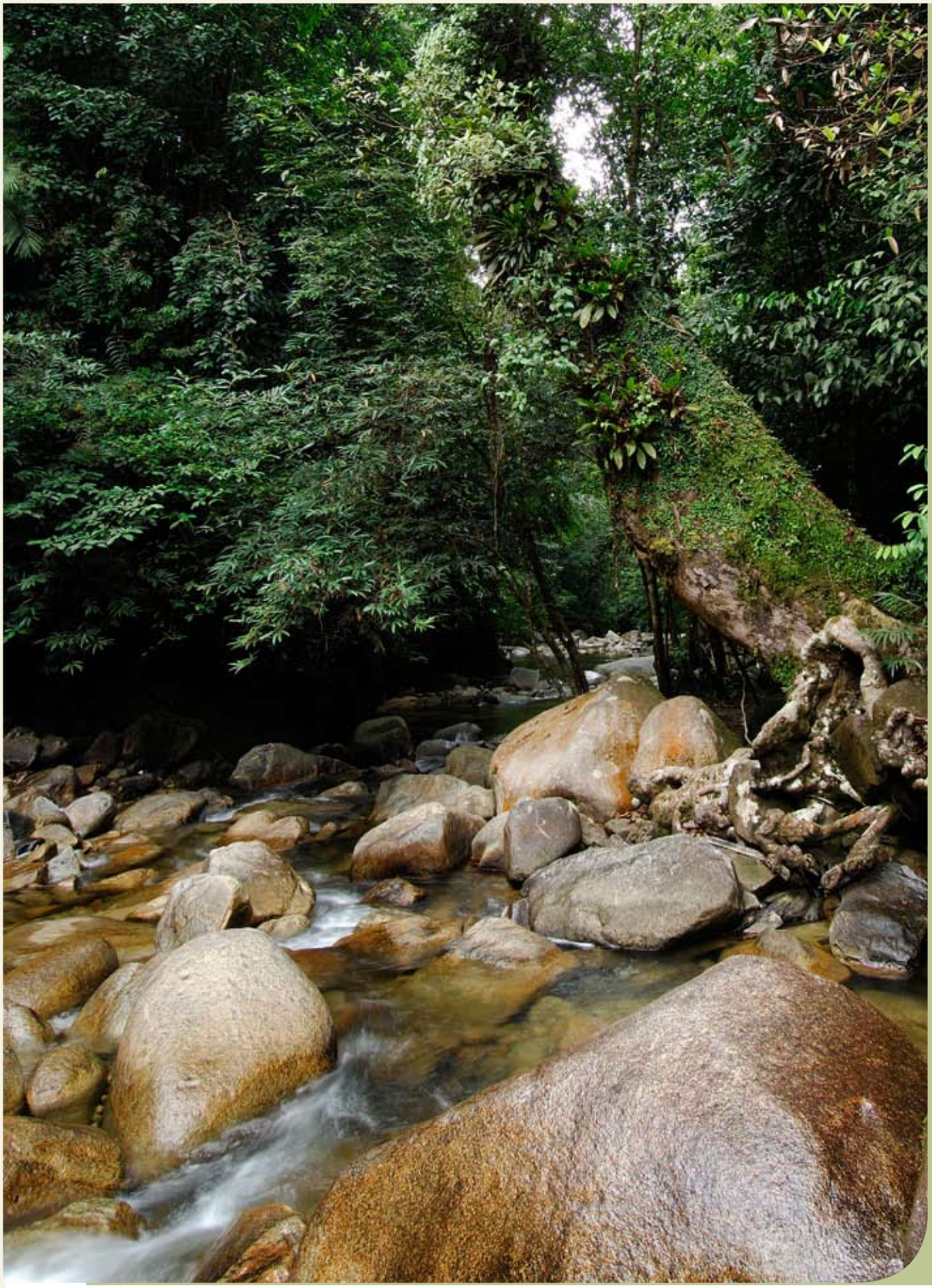


Figure 3.8 Malaysia: River Water Quality Trend based on SS sub-index (2005 - 2009)



A clean river is nature's beauty