

ALAM SEKITAR



ENVIRONMENT

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Nota Keterangan

1. Data berhubung Indeks Pencemaran Udara (IPU) dan status kualiti air sungai diperoleh daripada Jabatan Alam Sekitar (JAS), dari 1998 hingga 2015.

2. Indeks Pencemaran Udara (IPU)

IPU menunjukkan status kualiti udara di stesen terpilih iaitu di Cheras, Kuala Lumpur; Larkin, Johor Bahru; Bandaraya Melaka; Seberang Jaya; Kuching; Kota Kinabalu dan Miri. Bahan pencemar udara yang diambilkira dalam pengiraan IPU Malaysia adalah Ozon (O₃), Karbon Monoksida (CO), Nitrogen Dioksida (NO₂), Sulfur Dioksida (SO₂) dan Habuk Halus bersaiz kurang dari 10 mikron (PM₁₀).

Ukuran indeks bagi menunjukkan status kualiti udara dikategorikan seperti berikut:

| Nilai IPU | Status |
|--------------|--------------------|
| 0 – 50 | Baik |
| 51 – 100 | Sederhana |
| 101 – 200 | Tidak Sihat |
| 201 – 300 | Sangat Tidak Sihat |
| Melebihi 300 | Berbahaya |

ENVIRONMENT

Explanatory Notes

1. Data pertaining to Air Pollutant Index (API) and river water quality status are obtained from the Department of Environment (DOE), from 1998 to 2014.

2. Air Pollutant Index (API)

API shows the air quality status in the selected stations namely in Cheras, Kuala Lumpur; Larkin, Johor Bahru; Bandaraya Melaka; Seberang Jaya; Kuching; Kota Kinabalu and Miri. The air pollutants included in Malaysian's API calculation are Ozone (O₃), Carbon Monoxide (CO), Nitrogen Dioxide (NO₂), Sulphur Dioxide (SO₂) and Particulate Matter of less than 10 microns in size (PM₁₀).

Index value to indicate the status of the air quality are categorized as follows:

| Value of API | Status |
|--------------|----------------|
| 0 – 50 | Good |
| 51 – 100 | Moderate |
| 101 – 200 | Unhealthy |
| 201 – 300 | Very Unhealthy |
| Above 300 | Hazardous |

3. Kualiti Air Sungai

Program Pemantauan Kualiti Air Sungai dijalankan oleh JAS untuk mengenalpasti status kualiti air sungai, mengesan perubahan kualiti air disebabkan oleh aktiviti pembangunan dan juga mengenal pasti punca pencemaran.

Sampel air telah diambil daripada stesen-stesen pemantauan dan dianalisa bagi mengukur Indeks Kualiti Air (IKA). Enam parameter yang dianalisa ialah Keperluan Oksigen Biokimia (BOD_5), Ammoniacal Nitrogen (NH_3-N), Pepejal Terampai (SS), Keperluan Oksigen Kimia (COD), nilai pH dan Oksigen Terlarut (DO).

Hasil daripada penganalisaan tersebut, kualiti air sungai boleh diklasifikasikan kepada tiga kategori iaitu Bersih (B), Sederhana Tercemar (ST) dan Tercemar (T).

3. River Water Quality

River Water Quality Monitoring Programme conducted by DOE to establish the status of river water quality, to detect changes in water quality as a result of development activities and also to identify the sources of pollution.

Water samples collected from monitoring stations and analysed to derive the Water Quality Index (WQI). The six parameters which analysed are Biochemical Oxygen Demand (BOD_5), Ammoniacal Nitrogen (NH_3-N), Suspended Solids (SS), Chemical Oxygen Demand (COD), pH value and Dissolved Oxygen (DO).

As a result, river water quality could be classified into three categories namely Clean (C), Slightly Polluted (SP) and Polluted (P).

JADUAL 20.1a : BACAAN MAKSIMUM DAN MINIMUM TAHUNAN INDEKS PENCEMARAN UDARA BAGI STESEN TERPILIH, 1998 – 2015, MALAYSIA

Table 20.1a : Annual Maximum and Minimum Air Pollutant Index for Selected Stations, 1998 – 2015, Malaysia

| Tahun Year | Kualiti Udara/ Air Quality | | | | | | | | | | | | | |
|---------------|---|------|-----------------------|------|---------------------|------|------------------|------|--------------|------|------------------|------|--------------|------|
| | Indeks Pencemaran Udara (IPU) ¹ / Air Pollution Index (API) ¹ | | | | | | | | | | | | | |
| | Cheras Kuala Lumpur | | Larkin Johor Bharu | | Bandaraya Melaka | | Seberang Jaya | | Kuching | | Kota Kinabalu | | Miri | |
| | Mak. Max. | Min. | Mak. Max. | Min. | Mak. Max. | Min. | Mak. Max. | Min. | Mak. Max. | Min. | Mak. Max. | Min. | Mak. Max. | Min. |
| 1998 | 140 | 10 | 116 | 7 | 92 | 4 | 111 | 16 | 90 | 3 | 459 | 1 | 649 | 6 |
| 1999 | 137 | 3 | 114 | 6 | 77 | 3 | 79 | 10 | 76 | 4 | 70 | 1 | 120 | 4 |
| 2000 | 141 | 13 | 119 | 7 | 122 | 4 | 127 | 4 | 84 | 1 | 70 | 1 | 79 | 3 |
| 2001 | 157 | 16 | 119 | 10 | 127 | 3 | 140 | 8 | 84 | 1 | 80 | 1 | 84 | 2 |
| 2002 | 153 | 11 | 116 | 4 | 105 | 5 | 115 | 4 | 130 | 1 | 88 | 8 | 126 | 5 |
| 2003 | 143 | 11 | 112 | 2 | 114 | 6 | 106 | 11 | 85 | 6 | 76 | 2 | 86 | 3 |
| 2004 | 97 | 32 | 126 | 8 | 147 | 5 | 121 | 8 | 97 | 17 | 62 | 1 | 77 | 2 |
| 2005 | 390 | 5 | 111 | 1 | 114 | 2 | 151 | 10 | 78 | 23 | 63 | 2 | 133 | 2 |
| 2006 | 162 | 5 | 143 | 5 | 153 | 5 | 121 | 6 | 188 | 5 | 86 | 2 | 104 | 1 |
| 2007 | 131 | 4 | 141 | 0 | 92 | 4 | 101 | 8 | 75 | 6 | 64 | 3 | 73 | 6 |
| 2008 | 135 | 8 | 101 | 5 | 80 | 3 | 99 | 6 | 72 | 5 | 55 | 1 | 76 | 6 |
| 2009 | 168 | 4 | 99 | 2 | 137 | 4 | 106 | 5 | 114 | 10 | 78 | 1 | 179 | 6 |
| 2010 | 169 | 26 | 111 | 15 | 139 | 22 | 93 | 28 | 54 | 16 | 68 | 10 | 89 | 17 |
| 2011 | 150 | 11 | 84 | 3 | 97 | 12 | 98 | 6 | 100 | 4 | 61 | 2 | 96 | 4 |
| 2012 | 155 | 4 | 137 | 2 | 83 | 3 | 105 | 6 | 93 | 16 | 61 | 1 | 97 | 5 |
| 2013 | 186 | 22 | 226 | 17 | 415 | 16 | 132 | 27 | 89 | 17 | 90 | 8 | 93 | 18 |
| 2014 | 170 | 3 | 198 | 10 | 128 | 5 | 119 | 14 | 123 | 11 | 59 | 3 | 84 | 2 |
| 2015 | 185 | 9 | 192 | 28 | 176 | 6 | 287 | 9 | 209 | 5 | 75 | 5 | 99 | 4 |

Nota / Notes :

¹Bacaan status kualiti udara berdasarkan bacaan maksimum harian

Air quality status readings are based on daily maximum readings

JADUAL 20.1b : BILANGAN LEMBANGAN SUNGAI YANG DIAWASI MENGIKUT KATEGORI, MALAYSIA, 1998 – 2015

Table 20.1b : Number of River Basins Monitored by Category, Malaysia, 1998 – 2015

| Tahun Year | Kualiti Air / Water Quality | | | |
|---------------|---|-----------------------------|--|------------------------|
| | Kategori / Category | | | |
| | Jumlah Lembangan Sungai Diawasi <i>Total River Basins Monitored</i> | Tercemar <i>Polluted</i> | Sederhana Tercemar <i>Slightly Polluted</i> | Bersih <i>Clean</i> |
| 1998 | 120 | 16 | 71 | 33 |
| 1999 | 120 | 13 | 72 | 35 |
| 2000 | 120 | 12 | 74 | 34 |
| 2001 | 120 | 13 | 47 | 60 |
| 2002 | 120 | 14 | 43 | 63 |
| 2003 | 120 | 9 | 52 | 59 |
| 2004 | 120 | 9 | 53 | 58 |
| 2005 | 146 | 15 | 51 | 80 |
| 2006 | 146 | 7 | 59 | 80 |
| 2007 | 143 | 7 | 45 | 91 |
| 2008 | 143 | 7 | 60 | 76 |
| 2009 | 143 | 9 | 64 | 70 |
| 2010 | 143 | 13 | 65 | 65 |
| 2011 | 140 | 11 | 53 | 76 |
| 2012 | 140 | 12 | 54 | 74 |
| 2013 | 140 | 10 | 56 | 74 |
| 2014 | 140 | 12 | 66 | 62 |
| 2015 | 140 | 5 | 64 | 71 |

JADUAL 20.2 : PELEPASAN BAHAN PENCEMAR KE UDARA MENGIKUT JENIS DAN PUNCA, 1998 – 2015, MALAYSIA

Table 20.2 : Emission of Pollutants to the Atmosphere by Type and Sources, 1998 – 2015, Malaysia

(‘000) Tan Metrik / Tonnes

| Tahun Year | Punca Tetap Stationary Sources | | Kenderaan Bermotor Mobile Vehicles | Lain- lain' Others ¹ | Jumlah Total |
|---------------|-----------------------------------|------------------------------------|---------------------------------------|------------------------------------|-----------------|
| | Industri Industrial | Stesen Janakuasa Power Plant | | | |
| | | | | | |
| 1998 | 706.5 | .. | 2,402.8 | 146.5 | 3,255.8 |
| 1999 | 461.4 | .. | 2,563.1 | 114.2 | 3,138.7 |
| 2000 | 566.7 | .. | 2,642.6 | 29.2 | 3,238.5 |
| 2001 | 308.0 | .. | 2,561.7 | 8.6 | 2,878.3 |
| 2002 | 702.1 | .. | 2,939.9 | 14.6 | 3,656.6 |
| 2003 | 125.1 | 127.4 | 1,649.1 | 163.2 | 2,064.8 |
| 2004 | 372.4 | 359.0 | 1,478.6 | 38.7 | 2,248.7 |
| 2005 | 157.3 | 148.8 | 1,538.0 | 23.1 | 1,867.2 |
| 2006 | 158.7 | 150.7 | 1,631.4 | 44.9 | 1,985.7 |
| 2007 | 132.9 | 178.2 | 2,172.8 | 49.4 | 2,533.4 |
| 2008 | 148.7 | 221.4 | 1,630.8 | 54.4 | 2,055.3 |
| 2009 | 166.3 | 595.9 | 1,762.8 | 60.3 | 2,585.3 |
| 2010 | 113.9 | 619.2 | 1,829.7 | 60.4 | 2,623.2 |
| 2011 | 116.4 | 633.5 | 1,905.6 | 90.6 | 2,746.1 |
| 2012 | 86.4 | 693.2 | 2,024.6 | 151.5 | 2,955.7 |
| 2013 | 86.0 | 701.8 | 2,025.6 | 142.4 | 2,955.8 |
| 2014 | 101.9 | 742.9 | 2,092.0 | 88.1 | 3,024.9 |
| 2015 | 85.3 | 746.8 | 2,149.5 | 88.5 | 3,070.2 |

Nota / Notes :

¹ Data tahun 1998-2002 merujuk kepada Pembakaran Sisa Industri. Mulai 2003, termasuk hotel, pusat komersial, institusi dan pasar malam.
1998-2002 data refer to Burning of Industrial Waste. Commencing 2003, include hotels, commercial centres, institutions and night markets.

.. Data tidak diperoleh memandangkan tiada perincian bagi punca tetap
Data is not available as there is no detail for stationary sources

JADUAL 20.3 : STATUS KUALITI AIR SUNGAI BERDASARKAN PENCEMAR UTAMA, 1998 – 2015, MALAYSIA

Table 20.3 : Status of River Water Quality based on Main Pollutants, 1998 – 2015, Malaysia.

| Tahun Year | Jumlah Lembangan Sungai Yang Diawasi Total River Basins Monitored | Keperluan Oksigen Biokimia (BOD.) Biochemical Oxygen Demand | | | Ammoniakal Nitrogen (NH ₃ -N) Ammoniacal Nitrogen | | | Pepejal Terampai (SS) Suspended Solids | | |
|---------------|--|--|----|----|---|----|----|---|----|-----|
| | | T | ST | B | T | ST | B | T | ST | B |
| | | P | SP | C | P | SP | C | P | SP | C |
| | | | | | | | | | | |
| 1998 | 120 | 25 | 36 | 59 | 52 | 53 | 15 | 41 | 28 | 51 |
| 1999 | 120 | 31 | 75 | 14 | 33 | 70 | 17 | 45 | 22 | 53 |
| 2000 | 120 | 18 | 63 | 39 | 22 | 48 | 50 | 53 | 25 | 42 |
| 2001 | 120 | 21 | 41 | 58 | 24 | 43 | 53 | 38 | 25 | 57 |
| 2002 | 120 | 22 | 29 | 69 | 29 | 40 | 51 | 28 | 14 | 78 |
| 2003 | 120 | 15 | 29 | 76 | 29 | 37 | 54 | 28 | 17 | 75 |
| 2004 | 120 | 18 | 37 | 65 | 30 | 47 | 43 | 31 | 11 | 78 |
| 2005 | 146 | 28 | 41 | 77 | 43 | 54 | 49 | 34 | 22 | 90 |
| 2006 | 146 | 22 | 28 | 96 | 41 | 56 | 49 | 42 | 20 | 84 |
| 2007 | 143 | 12 | 37 | 94 | 36 | 56 | 48 | 42 | 39 | 62 |
| 2008 | 143 | 18 | 46 | 79 | 33 | 38 | 72 | 53 | 33 | 57 |
| 2009 | 143 | 42 | 73 | 28 | 40 | 47 | 56 | 57 | 32 | 54 |
| 2010 | 143 | 52 | 79 | 12 | 42 | 66 | 35 | 48 | 27 | 68 |
| 2011 | 140 | 57 | 80 | 3 | 35 | 64 | 41 | 35 | 26 | 79 |
| 2012 | 140 | 59 | 69 | 12 | 38 | 67 | 35 | 16 | 28 | 96 |
| 2013 | 140 | 94 | 46 | - | 41 | 58 | 41 | 11 | 24 | 105 |
| 2014 | 140 | 125 | 15 | - | 40 | 59 | 41 | 19 | 22 | 99 |
| 2015 | 140 | 121 | 19 | - | 43 | 65 | 32 | 20 | 13 | 107 |

Nota : T – Tercemar ST – Sederhana Tercemar B – Bersih
 Note : P – Polluted SP – Slightly Polluted C – Clean