

Inventori Punca Pencemaran

*Pollution Sources
Inventory*



BAB 5

Chapter



PENGIRAAN BEBAN PENCEMARAN

Pendahuluan

Beban pencemaran air ditakrifkan sebagai kepekatan bahan cemar yang dibawa oleh jasad air pada sesuatu masa yang diberikan. Beban pencemaran ini dipengaruhi oleh faktor kadar alir jasad air tersebut dan juga kepekatan bahan cemar yang dibawa.

Beban pencemaran air adalah kriteria penting bertujuan untuk mengatur strategi dan merancang tindakan pencegahan dan mengawal pencemaran. Pelaksanaan kawalan beban pencemaran air adalah usaha untuk meningkatkan kualiti air sungai demi mengekalkan pelbagai kegunaan berfaedah sungai seperti sumber bekalan air, rekreasi, ternakair (akuakultur), pertanian serta menampung keperluan sistem ekologi.

BEBAN PENCEMARAN AIR

Pada tahun 2018, anggaran pengiraan beban pencemaran ditumpukan ke atas lima (5) jenis punca pencemaran air iaitu industri pembuatan, industri berasaskan pertanian, loji rawatan kumbahan, ternakan babi dan pasar basah.

Sumber data industri pembuatan dan industri berasaskan pertanian diperolehi daripada JAS negeri manakala bagi loji rawatan kumbahan adalah daripada Indah Water Konsortium Sdn. Bhd. Data-data berkaitan aktiviti ternakan babi diperolehi daripada Jabatan Perkhidmatan Veterinar dan Pihak Berkuasa Tempatan membekalkan data bilangan pasar basah.

POLLUTION LOAD CALCULATION

Introduction

Water pollution load is define as concentration of pollutants carried by the water body at a given time. Pollution load is influenced by the water body flowrate and the pollutants' concentration carried by the water body.

The water pollution load is one of important criterion in planning and strategizing the mode of action for pollution prevention and control. The implementation of the pollution load control will enhance the river water quality in order to maintain the beneficial use of river as a source of watersupply, recreation, aquaculture, agriculture as well as to maintain the ecological system demand.

WATER POLLUTION LOAD

In the year 2018, the estimation of pollution load is focused on five (5) type of water pollution sources such as manufacturing industries, agricultural-based industries, sewage treatment plant, piggery and wet market.

The source of data for manufacturing industries and agriculture-based industries were provided by states DOE while sewage treatment plant data were obtained from Indah Water Consortium Sdn. Bhd. All data regarding piggery were provided by Department of Veterinary Services and data on wet market were acquired from Local Authority.

Pengiraan beban pencemaran ditumpukan kepada tiga (3) parameter utama yang memberikan kesan ketara kepada kualiti air sungai iaitu Keperluan Oksigen Biokimia (BOD), Pepejal Terampai (SS) dan Ammoniakal Nitrogen (NH_3N).

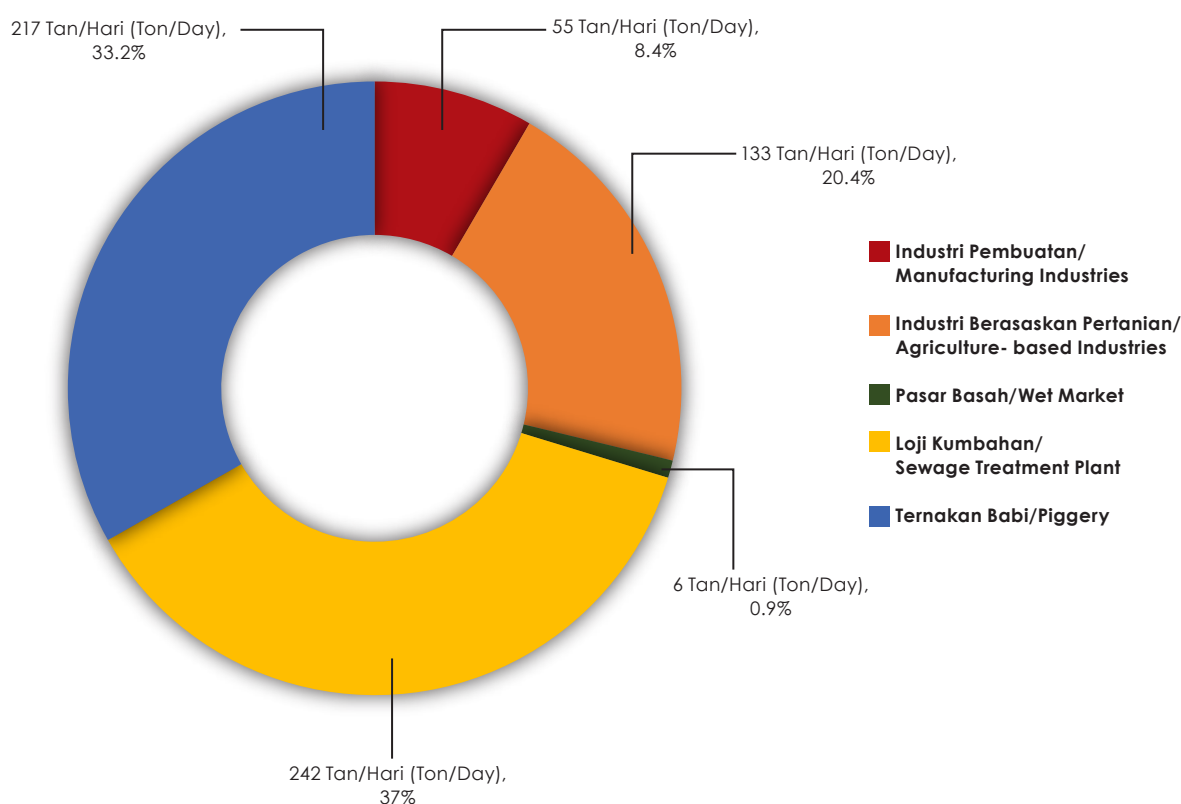
Keperluan Oksigen Biokimia

Pada tahun 2018, anggaran jumlah beban pencemaran BOD terhasil adalah sebanyak 653 tan/hari. Pelepasan daripada loji kumbahan adalah penyumbang beban pencemaran BOD tertinggi iaitu sebanyak 242 tan/hari (37%), diikuti dengan aktiviti ternakan babi menyumbang sebanyak 217 tan/hari (33.2%), industri pembuatan 55 tan/hari (8.4%), industri berasaskan pertanian 133 tan/hari (20.4%) dan pasar basah 6 tan/hari (0.9%) (**Rajah 5.1**).

Assessment on pollution load is mainly focused on three (3) main parameters that show high impact on the water body namely Biochemical Oxygen Demand (BOD), Suspended Solids (SS) and Ammoniacal Nitrogen (NH_3N).

Biochemical Oxygen Demand

In year 2018, a total estimation of 653 tonnes/day pollution load for BOD were generated. Sewage treatment plants remained as the largest BOD-load contributor with a total load of 242 tonnes/day (37%), followed by piggery activities which contributed 217 tonnes/day (33.2%), manufacturing industries 55 tonnes/day (8.4%), agriculture-based industries 133 tonnes/day (20.4%) and wet markets 6 tonnes/day (0.9%) **Figure 5.1**.



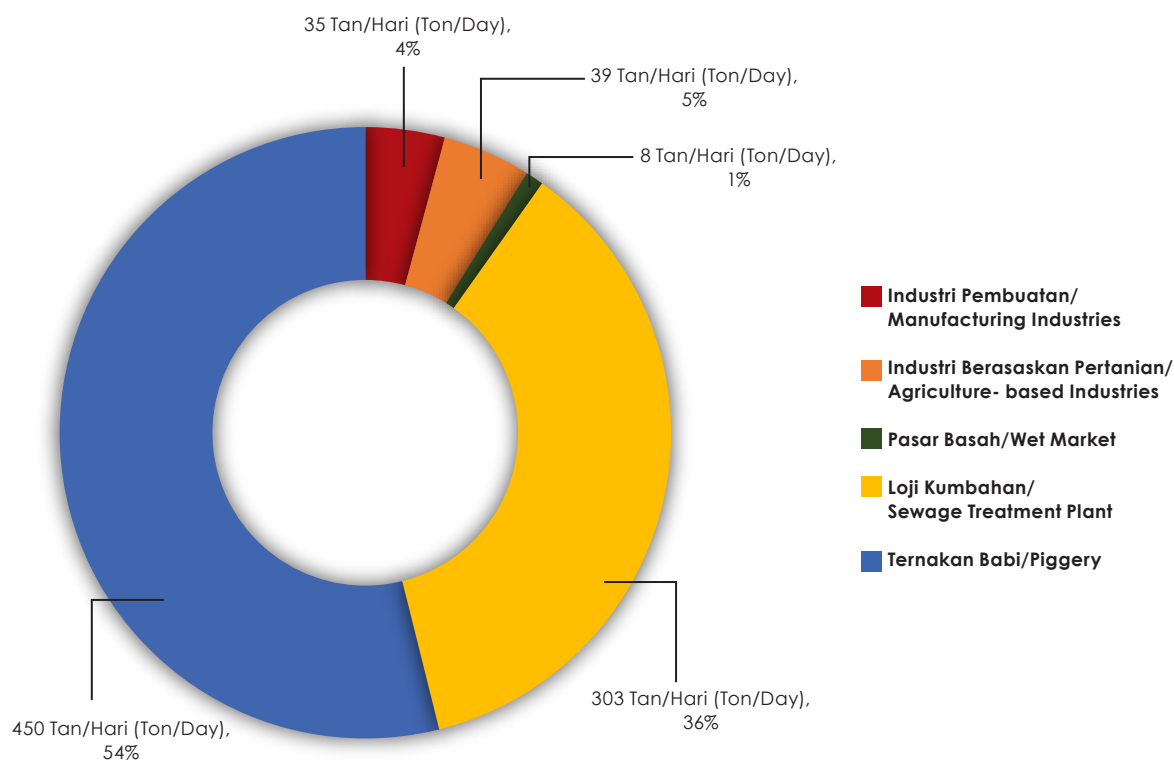
Rajah 5.1: Anggaran Beban BOD Mengikut Punca Pencemaran Air, 2018
Figure 5.1: Estimation of BOD Load Based on Sources of Water Pollution, 2018

Beban Pepejal Terampai

Pada tahun 2018, anggaran penghasilan beban pencemaran bagi SS adalah sebanyak 835 tan/hari, di mana aktiviti ternakan babi kekal sebagai penghasil beban SS utama sebanyak 450 tan/hari (54%), diikuti loji kumbahan sebanyak 303 tan/hari (36%), industri berasaskan pertanian 39 tan/hari (5%), industri pembuatan 35 tan/hari (4%), dan pasar basah 8 tan/hari (1%) (**Rajah 5.2**).

Suspended Solids Load

In year 2018, the overall estimation of SS loads gave a total figure of 835 tonnes/day where the piggery activity remained as the largest contributor with a total load of 450 tonnes/day (54%), followed by sewage treatment plant 303 tonnes/day (36%), agriculture-based industries 39 tonnes/day (5%), manufacturing industries 35 tonnes/day (4%), and wet market 8 tonnes/day (1%) (**Figure 5.2**).



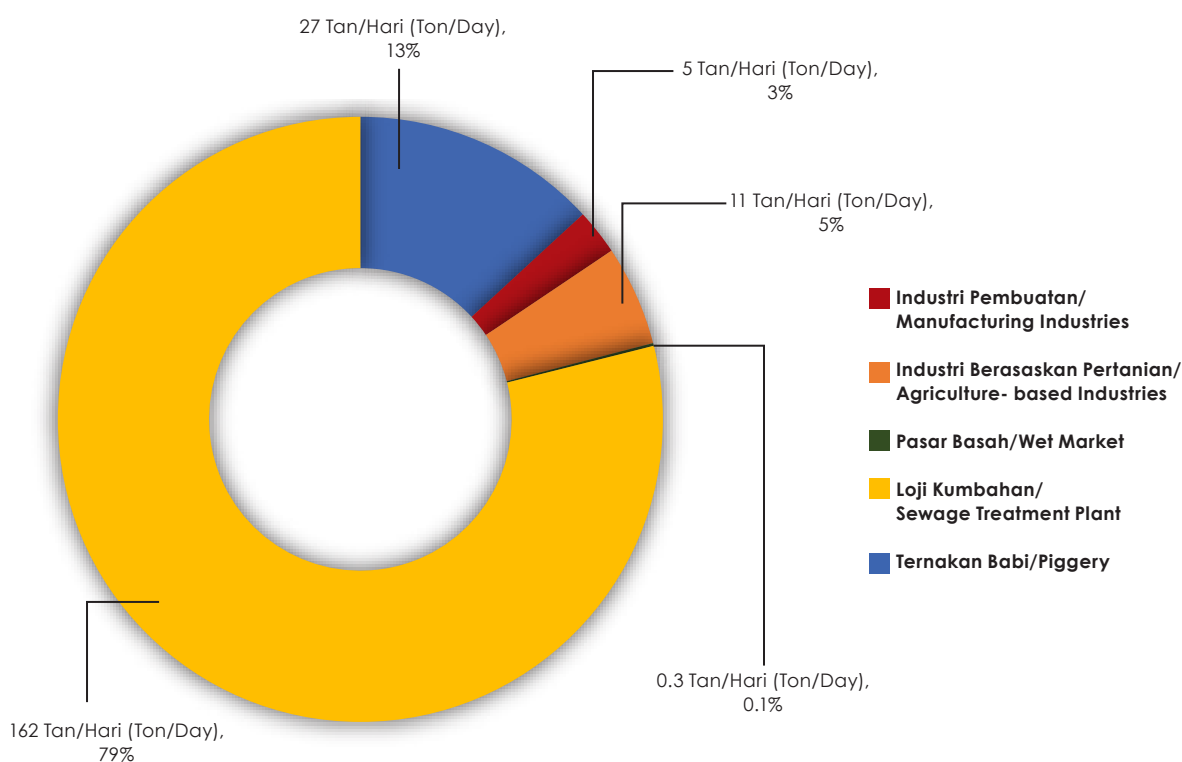
Rajah 5.2: Anggaran Beban SS Mengikut Punca Pencemaran Air, 2018
Figure 5.2: Estimation of SS Load Based on Sources of Water Pollution, 2018

Beban Ammoniakal Nitrogen

Pada tahun 2018, anggaran beban pencemar NH_3N adalah sebanyak 205.3 tan/hari di mana pelepasan loji kumbahan adalah penyumbang terbesar beban NH_3N dengan jumlah sebanyak 162 tan/hari (79%), diikuti aktiviti ternakan babi iaitu 27 tan/hari (13%), industri berasaskan pertanian 11 tan/hari (5%), industri pembuatan 5 tan/hari (3%) dan pasar basah 0.3 tan/hari (0.1%) (**Rajah 5.3**).

Ammoniacal Nitrogen Load

In year 2018, the NH_3N load is estimated to be a total of 205.3 tonnes/day in which sewage treatment plant remained as the largest contributor with a total load of 162 tonnes/day (79%), followed by piggery activity 27 tonnes/day (13%), agriculture-based industries 11 tonnes/day (5%), manufacturing industries 5 tonnes/day (3%) and wet market 0.3 tonnes/day (0.1%) (**Figure 5.3**).



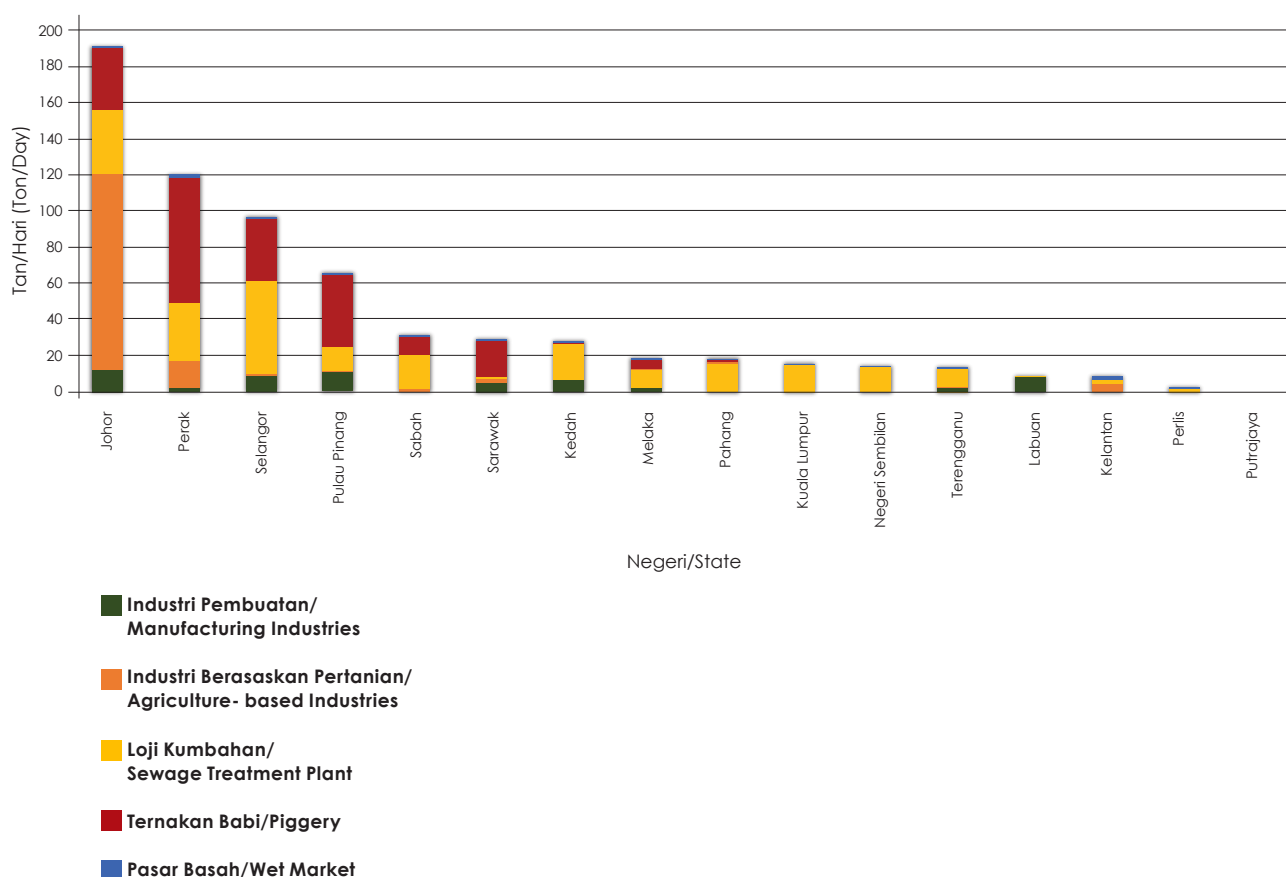
Rajah 5.3: Malaysia; Anggaran Beban NH_3N Mengikut Punca Pencemaran Air, 2018
Figure 5.3 : Malaysia; Assessment of NH_3N Load Based on Sources of Water Pollution, 2018

Beban Pencemaran Keperluan Oksigen Biokimia (BOD) Mengikut Negeri

Anggaran penghasilan beban BOD di Negeri Johor adalah tertinggi iaitu sebanyak 190 tan/hari, diikuti negeri Perak 119 tan/hari, Selangor 96 tan/hari, Pulau Pinang 65 tan/hari, Sabah 31 tan/hari dan Sarawak sebanyak 29 tan/hari. Beban BOD untuk lain-lain negeri termasuk Wilayah Persekutuan Labuan dan Putrajaya adalah kurang daripada 27 tan/hari. Beban pencemar BOD mengikut negeri (Rajah 5.4).

Biochemical Oxygen Demand Load (BOD) By States

The estimation of BOD load generated in the state of Johor was recorded to be the highest with a value of 190 tonnes/day, followed by the state of Perak 119 tonnes/day, Selangor 96 tonnes/day, Penang 65 tonnes/day, Sabah 31 tonnes/day and Sarawak generated 29 tonnes/day. BOD load for the rest of the States including Federal Territory of Labuan and Putrajaya generated less than 27 tonnes/day. BOD pollution load based on States (Figure 5.4).



Rajah 5.4 : Taburan Anggaran Beban BOD dan Punca Pencemaran Air Mengikut Negeri, 2018

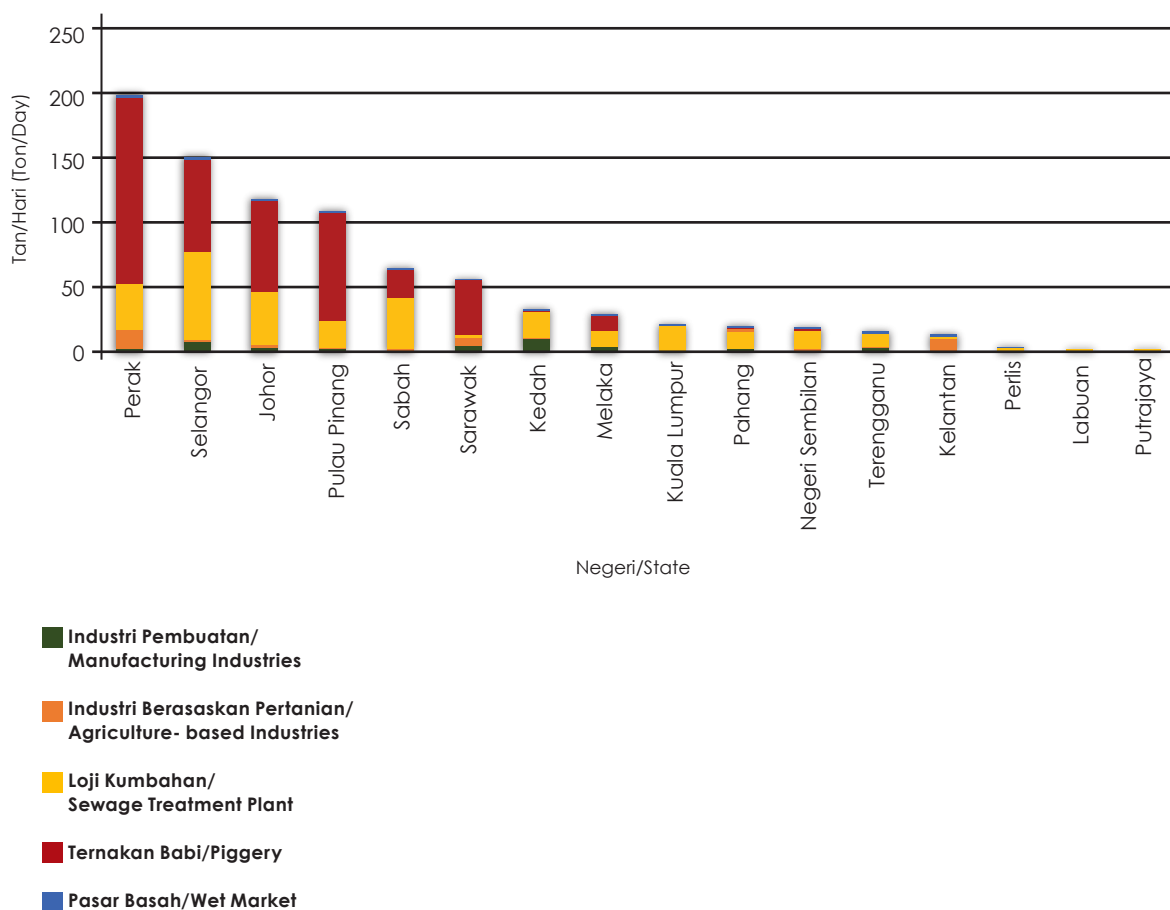
Figure 5.4 : Dispersions of BOD Load Assessment and Sources of Water Pollution by States, 2018

Beban Pencemaran Pepejal Terampai Mengikut Negeri

Anggaran penghasilan beban SS di Negeri Perak adalah tertinggi dengan jumlah sebanyak 197 tan/hari, diikuti Selangor 149 tan/hari, Johor 117 tan/hari, Pulau Pinang 108 tan/hari dan Sabah 64 tan/hari. Lain-lain negeri didapati menghasilkan kurang daripada 55 tan/hari (**Rajah 5.5**).

Suspended Solids Load By State

The estimation of SS load was recorded highest in the State of Perak with 197 tonnes/day, followed by the State of Selangor 149 tonnes/day, State of Johor 117 tonnes/day, State of Penang 108 tonnes/day and Sabah 64 tonnes/day. Other States generated less than 55 tonnes/day (**Figure 5.5**).



Rajah 5.5 : Taburan Anggaran Beban SS dan Punca Pencemaran Air Mengikut Negeri, 2018

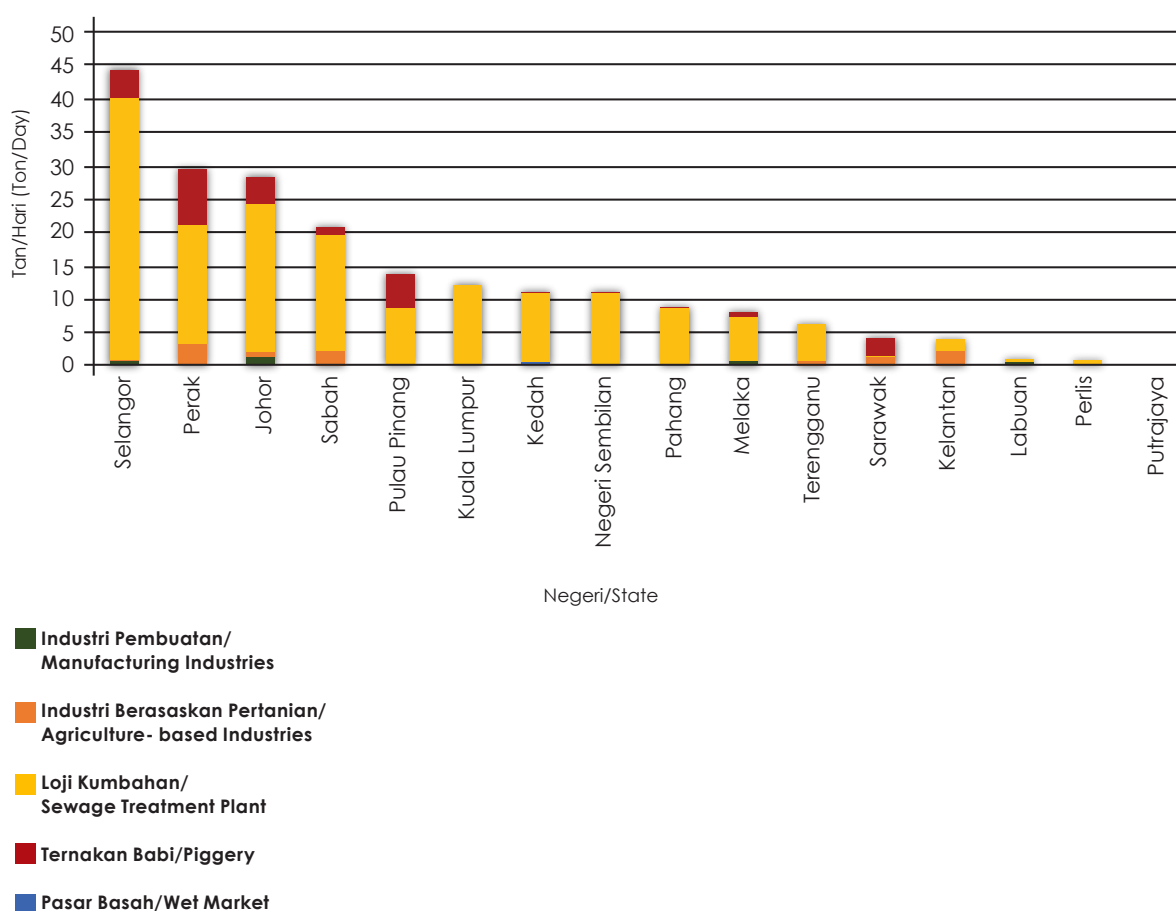
Figure 5.5 : Dispersions of SS Load Assessment and Sources of Water Pollution by States, 2018

Beban Pencemaran Ammoniakal Nitrogen Mengikut Negeri

Anggaran beban NH_3N di negeri Selangor mencatatkan nilai tertinggi berbanding dengan negeri-negeri lain, iaitu sebanyak 44 tan/hari. Diikuti negeri Perak 29 tan/hari, Johor 28 tan/hari. Lain-lain negeri didapati menyumbangkan kurang daripada 20 tan/hari (Rajah 5.6).

Ammoniacal Nitrogen Load By State

The state of Selangor recorded the highest value of NH_3N load compared to other states with a value of 44 ton/day. This is followed by State of Perak 29 tonnes/day, Johor 28 tonnes/day. Other states generated less than 20 tonnes/day (Figure 5.6).



Rajah 5.6 : Taburan Anggaran Beban NH_3N dan Punca Pencemaran Air Mengikut Negeri, 2018

Figure 5.6 : Dispersions of NH_3N Load Assessment and Sources of Water Pollution by States, 2018

PUNCA-PUNCA PENCEMARAN UDARA

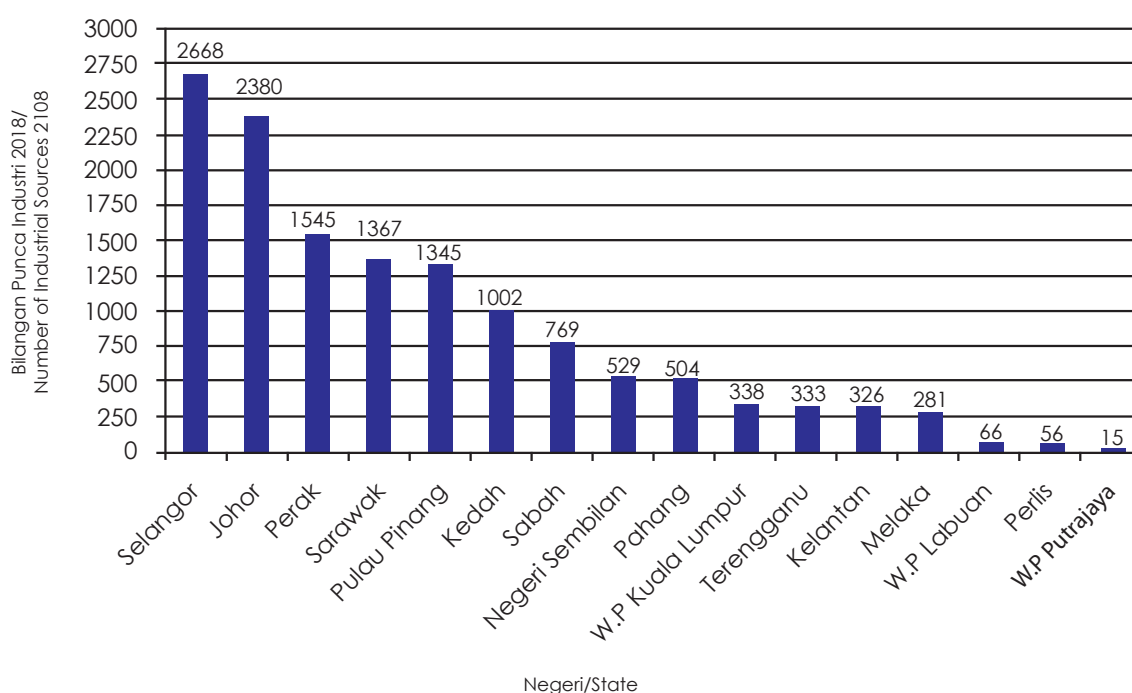
Peningkatan punca industri dan bilangan kenderaan bermotor boleh menyebabkan pencemaran udara yang teruk jika pelepasan pencemar termasuk pelepasan asap daripada kedua-dua aktiviti ini tidak dikawal dengan berkesan.

Sehingga bulan Disember 2018, jumlah punca industri yang melepaskan bahan pencemar ke udara adalah sebanyak 13,524. Bilangan punca pencemar yang tertinggi adalah di Selangor (2668:19.7%) diikuti Johor (2380:17.6%) dan Perak (1545:11.4%) (**Rajah 5.7**).

SOURCES OF AIR POLLUTION

The increasing trend of industrial sources and numbers of motor vehicles can cause severe air pollution if the emission including smoke emission from both sources were not effectively controlled.

As of December 2018, a total of 13,524 industrial sources were emitting air pollutants. The highest pollution sources were in Selangor (2,668:19.7%) followed by Johor (2,380:17.6%) and Perak (1,545:11.4%) (**Figure 5.7**).



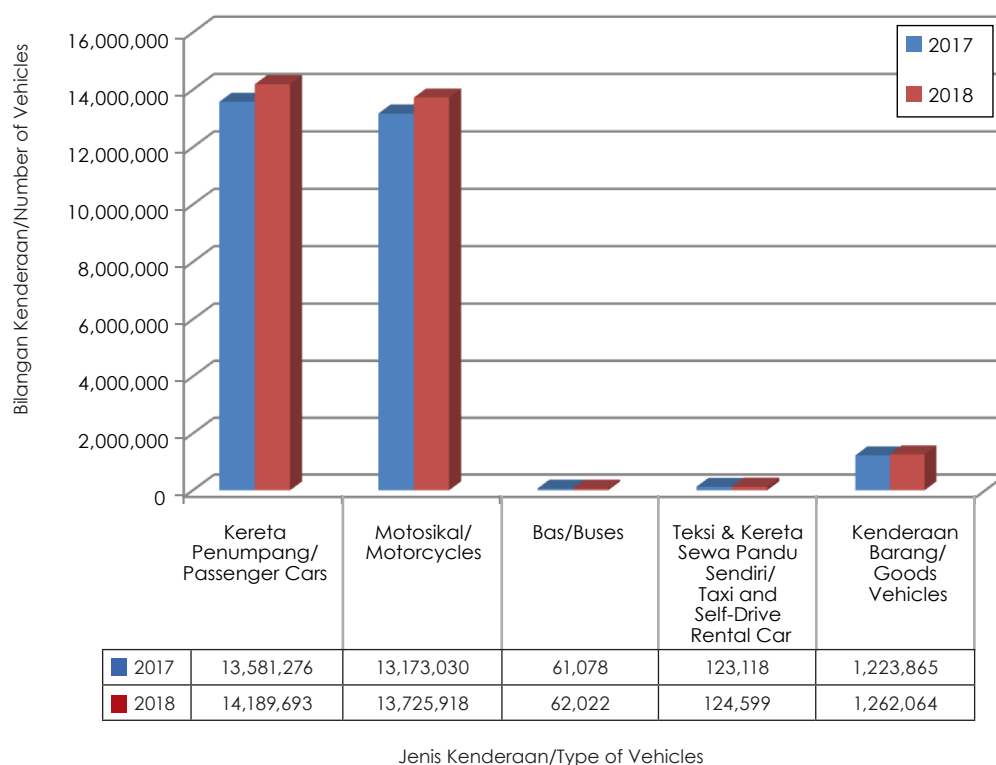
(Sumber: Sistem Inventori Pencemaran Alam Sekitar (SIMPAS), Jabatan Alam Sekitar)
(Sources: Environmental Pollution Inventory System (SIMPAS), Department of Environment)

Rajah 5.7 : Punca Pencemaran Udara Tertakluk Peraturan Udara Bersih Mengikut Negeri untuk Tahun 2018

Figure 5.7 : Industrial Air Pollution Subjected to Clean Air Regulations for Year 2018

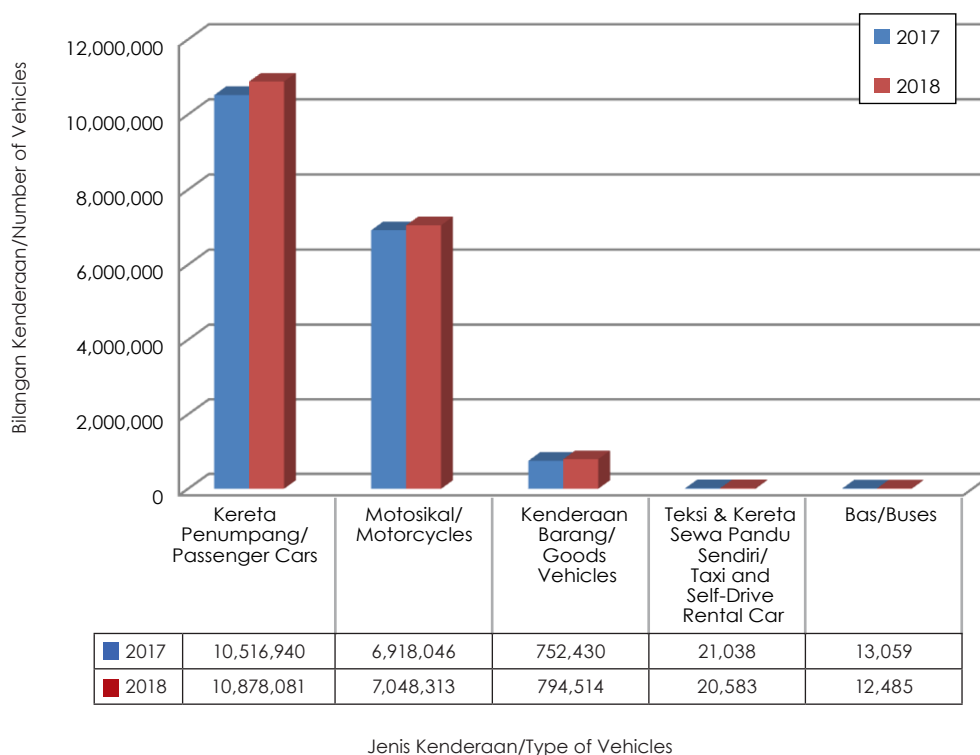
Seperti tahun-tahun yang lepas, pelepasan gas pencemar dari kenderaan bermotor merupakan punca utama yang menyumbang kepada pencemaran udara terutamanya di kawasan bandar. Pada tahun 2018, terdapat peningkatan bagi jumlah keseluruhan kenderaan bermotor yang didaftarkan. Bilangan pendaftaran yang direkodkan bagi teksi dan kenderaan sewa pandu sendiri meningkat sebanyak 1.19%, diikuti dengan peningkatan kenderaan penumpang 4.29%, motosikal 4.03%, kenderaan barangan 3.03%, dan bas 1.52% berbanding pada tahun 2017. Pendaftaran kenderaan bermotor yang direkodkan oleh Jabatan Pengangkutan Jalan pada tahun 2017 dan 2018 adalah seperti yang ditunjukkan dalam **Rajah 5.8**. Bilangan bagi kenderaan yang sedang digunakan dan yang masih aktif juga meningkat jumlahnya secara keseluruhan (2.84%). Bilangan bagi kenderaan penumpang, meningkat sebanyak 3.32%, kenderaan barang meningkat sebanyak 5.30% dan motosikal meningkat sebanyak 1.85%, manakala kategori lain menurun. Bilangan teksi menurun sebanyak 2.21% dan bas 4.60% jika dibandingkan dengan tahun 2017 (**Rajah 5.9**).

Similar to previous years, emission from motor vehicles remained as the major source of air pollution especially in urban areas. In 2018, there was an overall increase in the number of motor vehicles registered. The number of registered taxi and self-drive rental car increased by 1.19%, followed by increase of passenger cars 4.29%, motorcycles 4.03%, goods vehicles 3.03%, and buses 1.52% compared to 2017. The number of registered vehicles in Malaysia as reported by the Road Transport Department for 2017 and 2018 is shown in **Figure 5.8**. The number of in use vehicles or active on the road also has shown an overall increase in number (2.84%). The number of passenger vehicles has increased by 3.32%, goods vehicles increased by 5.30% and motorcycles increased by 1.85%, while other categories showed decreased number of vehicles active on the road. Taxis and self-drive rental car decreased by 2.21% and buses by 4.60% compared to 2017. (**Figure 5.9**).



(Sumber: Jabatan Pengangkutan Jalan, Malaysia 2018)
(Source: Road Transport Department, Malaysia, 2018)

Rajah 5.8 : Bilangan Kenderaan Berdaftar Tahun 2017–2018
Figure 5.8 : Number of Registered Vehicles in 2017–2018



(Sumber: Jabatan Pengangkutan Jalan, Malaysia 2018)
(Source: Road Transport Department, Malaysia, 2018)

Rajah 5.9 : Bilangan Kenderaan Aktif Tahun 2017-2018
Figure 5.9 : Number of in Use Vehicles in 2017-2018