

Inventori Punca Pencemaran

Pollution Sources Inventory



PENGIRAAN BEBAN PENCEMARAN (POLLUTION LOAD CALCULATION)

Pendahuluan

Beban pencemaran air adalah kepekatan bahan cemar yang dibawa oleh jasad air pada sesuatu masa yang diberikan. Secara matematik, beban pada dasarnya adalah hasil daripada pelepasan air dan kepekatan bahan di dalam air.

Beban pencemaran air adalah 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 2017, 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.

Pengiraan beban pencemaran di tumpukan 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 2017, anggaran jumlah beban pencemaran BOD adalah sebanyak 545 tan/hari. Pelepasan daripada loji kumbahan adalah penghasil beban pencemaran BOD tertinggi iaitu sebanyak 268 tan/hari (49%), diikuti aktiviti ternakan babi 210 tan/hari (39%), industri pembuatan 50 tan/hari (9%), industri berasaskan pertanian 11 tan/hari (2%) dan pasar basah 6 tan/hari (1%) ditunjukkan seperti di **Rajah 5.1**

Introduction

Water pollution load are the amount of polluting material that a water body is actually carrying at a given time. Mathematically, load is essentially the product of water discharge and the concentration of a substance in the water.

The pollution loads are useful in strategizing and planning the course of action for the prevention and control of pollution, as to maintain the beneficial use of rivers as a source of water supply, recreation, aquaculture, agriculture as well as meeting the needs of ecological system.

Water Pollution Load

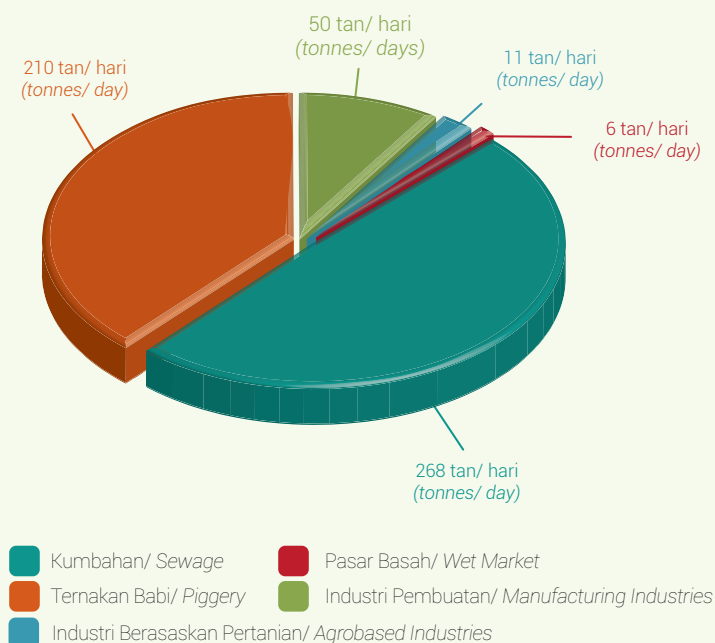
In the year of 2017, the estimation of pollution loads are focused on five (5) type of water pollution sources such as manufacturing industries, agricultural industries, sewage treatment plant, piggery and wet market.

State DOE provides data on manufacturing industries and agricultural industries while sewage treatment plant was obtained from Indah Water Consortium Sdn. Bhd. Department of Veterinary Services provide piggery data and data on wet market were acquired from Local Authority.

Assessment on pollution load were focused on three (3) prime parameter that shows high impact to the water body namely Biochemical Oxygen Demand (BOD), Suspended Solids (SS) and Ammoniacal Nitrogen (NH_3N).

Biochemical Oxygen Demand

*In year 2017, a total of 545 tonnes/day pollution load for BOD were generated. Sewage remained the largest BOD loads contributor with a total load of 268 tonnes/day (49%), followed by piggery which contributed 210 tonnes/day (39%), while manufacturing industries contributed 50 tonnes/day (9%), agro-based industries 11 tonnes/day (2 %) and wet markets 6 tonnes/ day (1%) as shown in **Figure 5.1**.*



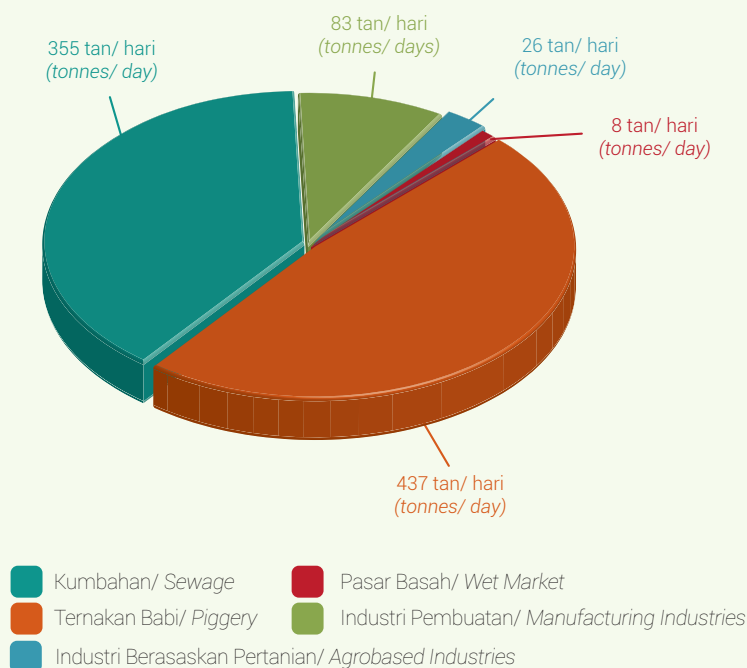
Rajah 5.1 Malaysia: Anggaran Beban BOD mengikut Punca Pencemaran Air, 2017
 Figure 5.1 Malaysia: Assessment of BOD Load by Sources of Water Pollution, 2017

Beban Pepejal Terampai

Pada tahun 2017, anggaran penghasilan beban pencemaran bagi SS adalah sebanyak 909 tan/hari, di mana aktiviti ternakan babi kekal sebagai penghasil beban SS utama sebanyak 437 tan/hari (48%), diikuti kumbahan sebanyak 355 tan/hari (39%), industri pembuatan 83 tan/hari (9%), industri berasaskan pertanian 26 tan/hari (3%), dan pasar basah 8 tan/hari (1%), seperti ditunjukkan dalam **Rajah 5.2**.

Suspended Solids Load

*In year 2017, estimation of summing-up the SS loads gave in a totalled of 909 tonnes/day in which piggery remain largest contributor with a total load of 437 tonnes/day (48%), followed by sewage 355 tonnes/day (39%), manufacturing industries 83 tonnes/day (9%), agro-based industries 26 tonnes/day (3%) and wet market 8 tonnes/day (1%) as shown in **Figure 5.2**.*



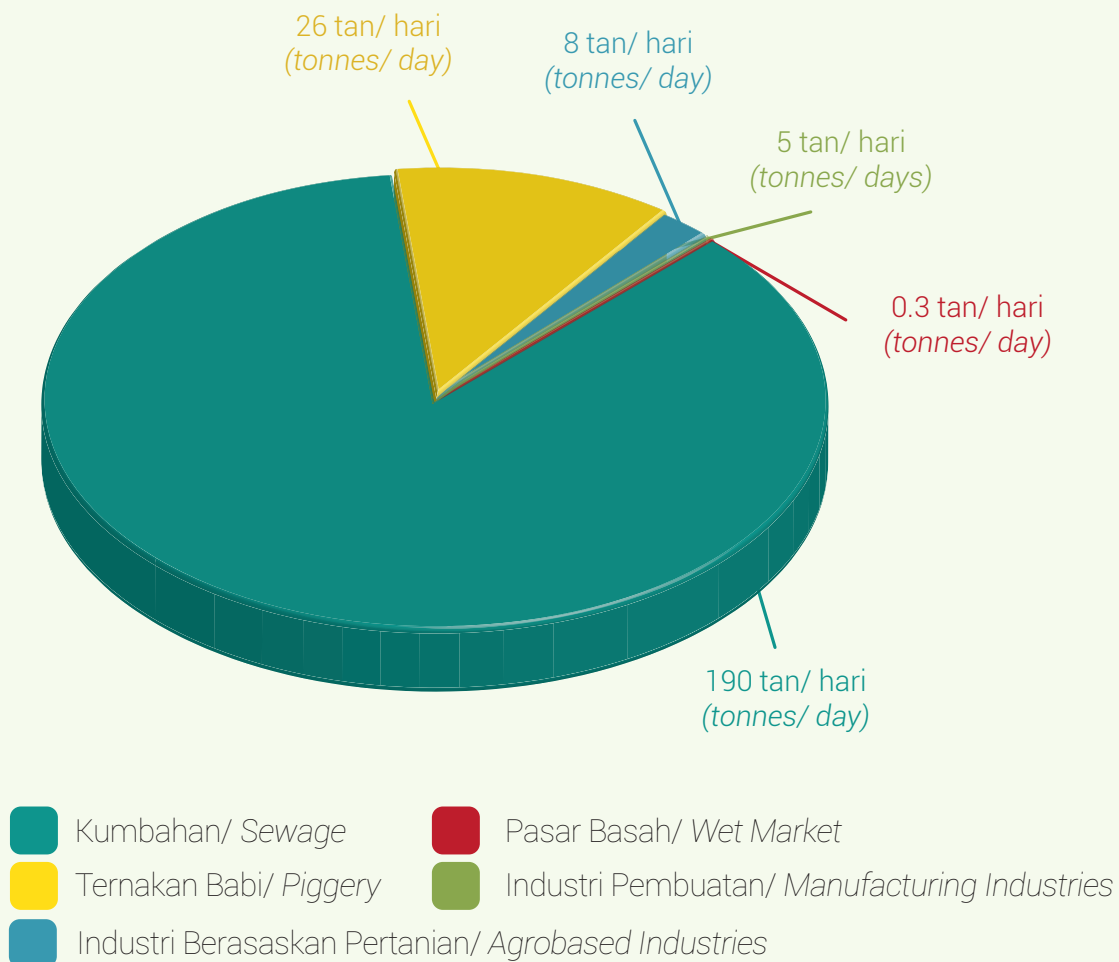
Rajah 5.2 Malaysia: Anggaran Beban SS mengikut Punca Pencemaran Air, 2017
 Figure 5.2 Malaysia: Assessment of SS Load by Sources of Water Pollution, 2017

Beban Ammoniakal Nitrogen

Pada tahun 2017, anggaran beban pencemar NH_3N sebanyak 229.3 tan/hari di mana pelepasan kumbahan adalah penghasil terbesar beban NH_3N dengan jumlah sebanyak 190 tan/hari (82.9%), diikuti aktiviti ternakan babi iaitu 26 tan/hari (11.3%), industri berasaskan pertanian 8 tan/hari (3.5%), industri pembuatan 5 tan/hari (2.2%) dan pasar basah 0.3 tan/hari (0.1%) ditunjukkan seperti dalam **Rajah 5.3**.

Ammoniacal Nitrogen Load

*In year 2017, estimation of summing-up NH_3N loads resulted a total of 229.3 tonnes/day in which sewage remain largest contributor with a total load of 190 tonnes/day (82.9%), followed by piggery activities 26 tonnes/day (11.3%), agro-based industries 8 tonnes/day (3.5%), manufacturing industries 5 tonnes/day (2.2%) and wet market 0.3 tonnes/day (0.1%) as shown in **Figure 5.3**.*



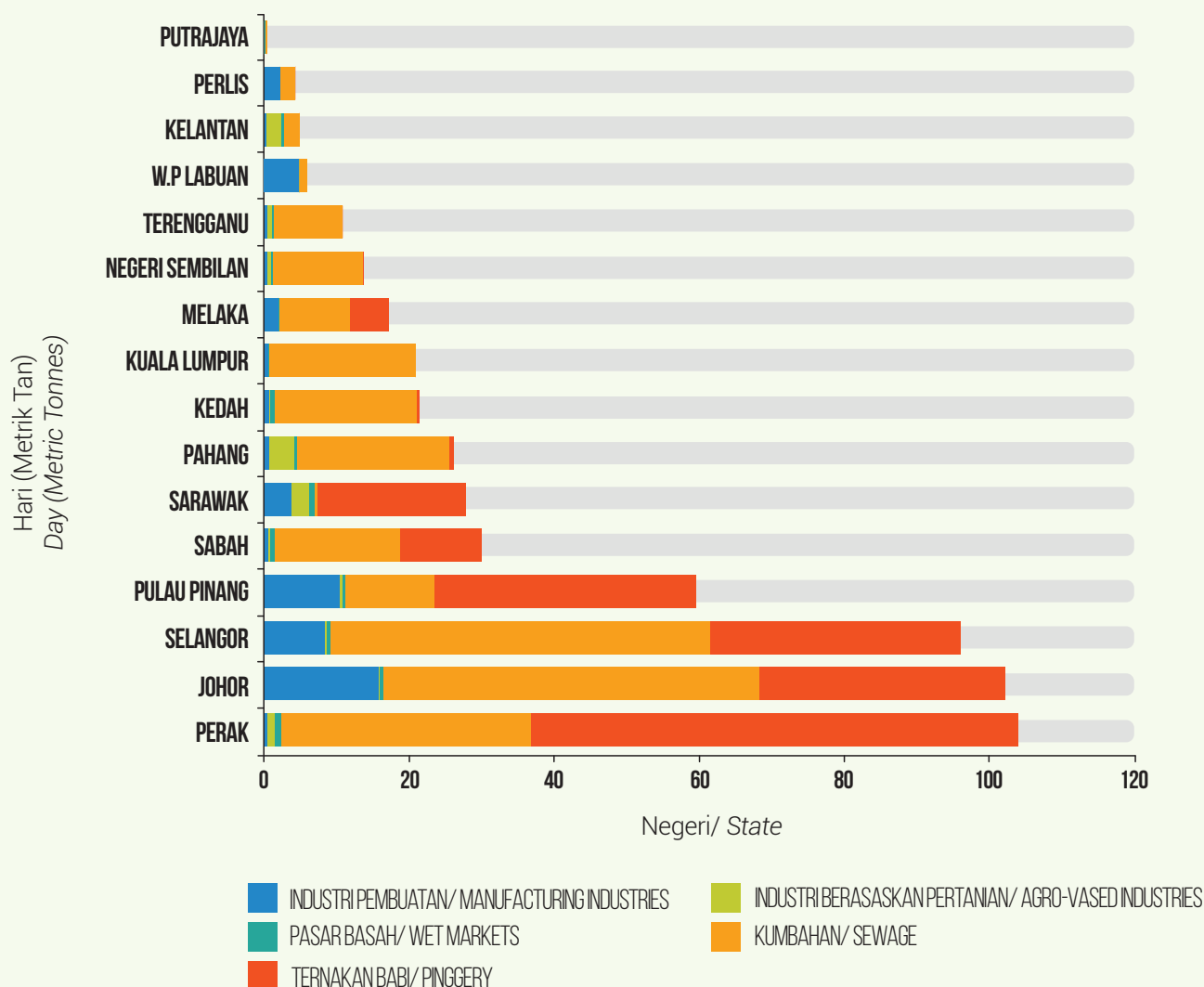
Rajah 5.3 Malaysia: Malaysia; Anggaran Beban NH_3N mengikut Punca Pencemaran Air, 2017
 Figure 5.3 Malaysia: Assessment of NH_3N Load by Sources of Water Pollution, 2017

Beban Pencemaran Keperluan Oksigen Biokimia (BOD) Mengikut Negeri

Anggaran pengiraan beban BOD di Negeri Perak adalah tertinggi iaitu sebanyak 104 tan/hari, diikuti negeri Johor 102 tan/hari, Selangor 96 tan/hari, Pulau Pinang 60 tan/hari, Sabah 30 tan/hari dan Sarawak sebanyak 28 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 ditunjukkan seperti di **Rajah 5.4**.

Biochemical Oxygen Demand Load (BOD) By States

*Estimation of BOD loads generated in the state of Perak recorded the highest value with 104 tonnes/day, followed by the state of Johor 102 tonnes/day, Selangor 96 tonnes/day, Penang 60 tonnes/day, Sabah 30 tonnes/day and Sarawak generated 28 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 state is shown in **Figure 5.4**.*



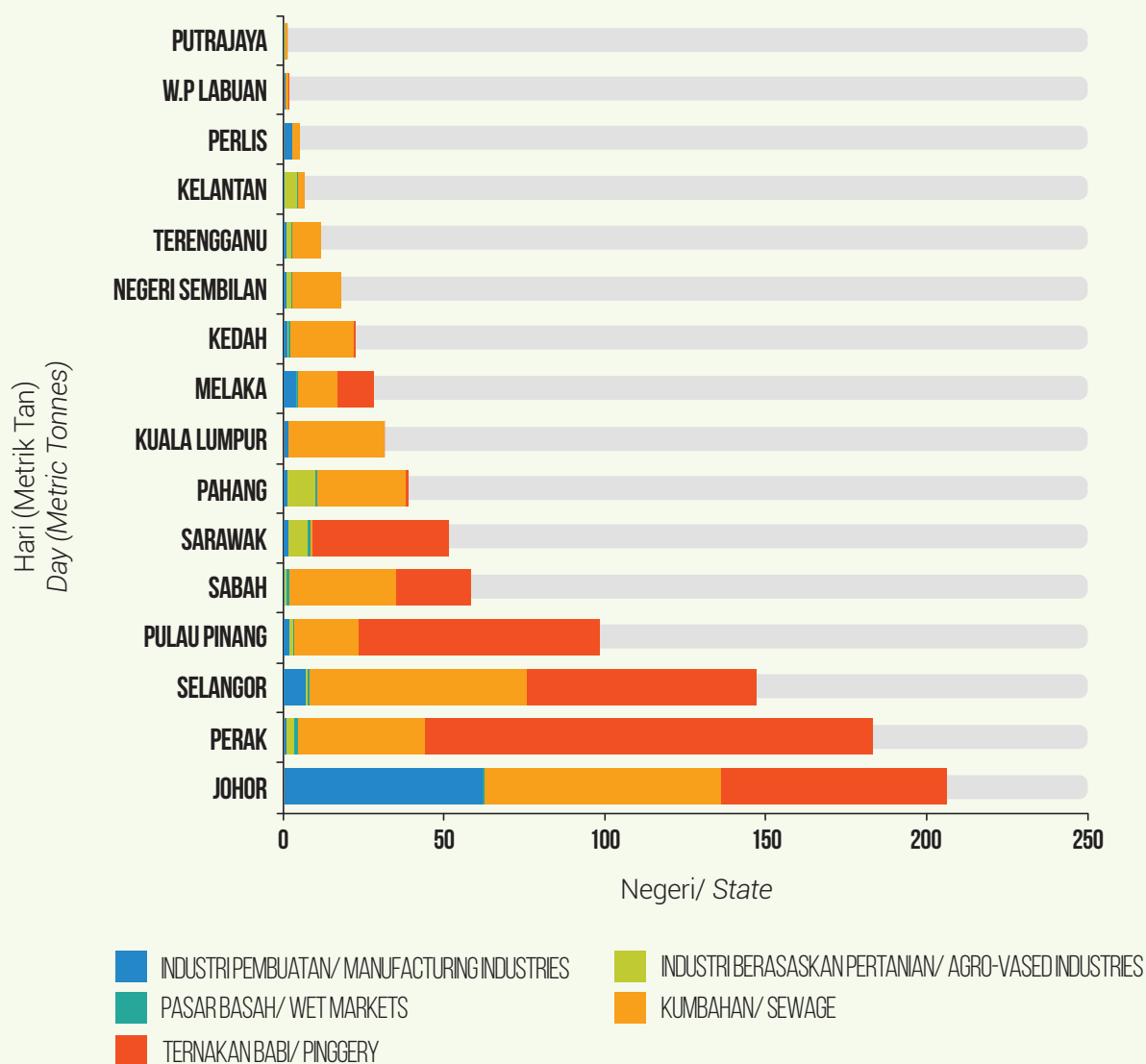
Rajah 5.4 Malaysia: Taburan Anggaran Beban BOD dan Punca Pencemaran Air mengikut Negeri, 2017
Figure 5.4 Malaysia: Dispersions of BOD Load Assessment and Sources of Water Pollution by States, 2017

Beban Pencemaran Pepejal Terampai Mengikut Negeri

Anggaran penjanaan beban SS di Negeri Johor di dapati tertinggi dengan jumlah sebanyak 207 tan/hari, diikuti Perak 184 tan/hari, Selangor 147 tan/hari, Pulau Pinang 98 tan/hari dan Sabah 58 tan/hari. Lain-lain negeri didapati menghasilkan kurang daripada 52 tan/hari ditunjukkan seperti di **Rajah 5.5**.

Suspended Solids Load By State

*The highest SS loads was generated in the state of Johor with 207 tonnes/ day, followed by the state of Perak 184 tonnes/ day, state of Selangor 147 tonnes/ day, state of Penang 98 tonnes/ day and Sabah state 58 tonnes/ day. Other states generated less than 52 tonnes/ day, as shown in **Figure 5.5**.*



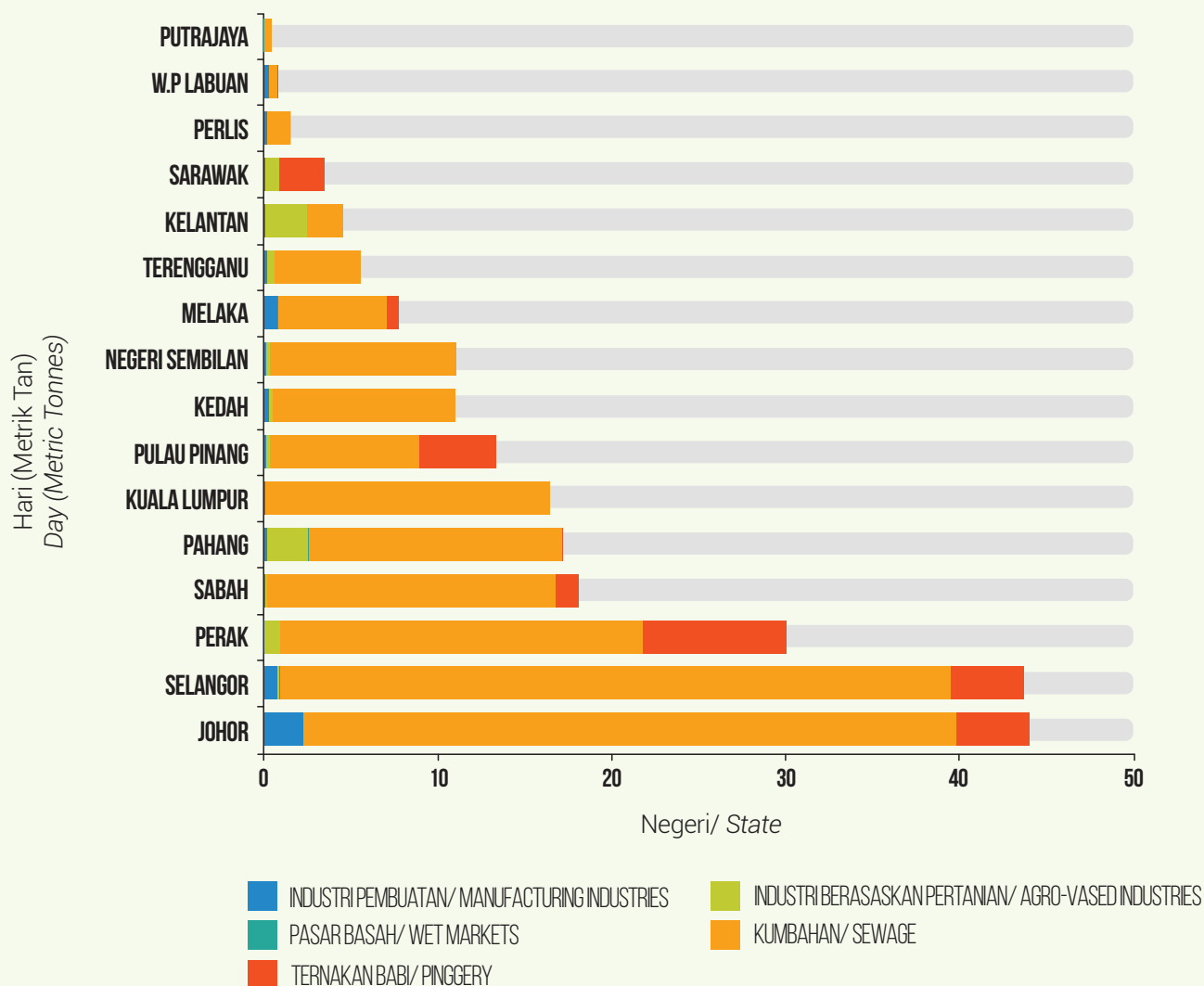
Rajah 5.5 Malaysia: Taburan Anggaran Beban SS dan Punca Pencemaran Air mengikut Negeri, 2017
Figure 5.5 Malaysia: Dispersions of SS Load Assessment and Sources of Water Pollution by States, 2017

Beban Pencemaran Ammoniakal Nitrogen Mengikut Negeri

Anggaran beban NH_3N di negeri Selangor dan Johor adalah tertinggi dengan masing-masing sebanyak 44 tan/hari. Diikuti Negeri Perak 30 tan/hari, Sabah 18 tan/hari, Pahang 17 tan/hari dan Wilayah Persekutuan Kuala Lumpur 16 tan/hari. Lain-lain Negeri didapati menyumbangkan kurang daripada 15 tan/hari, ditunjukkan sepertimana di **Rajah 5.6**.

Ammoniacal Nitrogen Load By State

*Estimation of NH_3N load in Selangor and Johor are the highest with 44 tons/day respectively. Followed by state of Perak 30 tonnes/day, Sabah 18 tonnes/day, Pahang 17 tonnes/day and Federal Territory of Kuala Lumpur 16 tonnes/day. Other states generated less than 15 tonnes/day, as shown in **Figure 5.6**.*



Rajah 5.6 Malaysia: Taburan Anggaran Beban NH_3N dan Punca Pencemaran Air Mengikut Negeri, 2017
 Figure 5.6 Malaysia: Dispersions of NH_3N Load Assessment and Sources of Water Pollution by States, 2017