KEMENTERIAN EKONOMI
JABATAN PERANGKAAN MALAYSIA

SABAH

2025

# STATISTIK ALAM SEKITAR

## *ENVIRONMENT STATISTICS*

JABATAN PERANGKAAN MALAYSIA
*DEPARTMENT OF STATISTICS MALAYSIA*

KEMENTERIAN EKONOMI
JABATAN PERANGKAAN MALAYSIA

# STATISTIK ALAM SEKITAR
# *ENVIRONMENT STATISTICS*

# SABAH
# 2025

**Pemakluman**

Malaysia buat julung kalinya telah menduduki tangga pertama (1) di peringkat global dalam laporan dwi-tahunan *Open Data Inventory* (ODIN) 2024/25 yang dikeluarkan oleh *Open Data Watch* (ODW), mengatasi 197 negara lain. Pencapaian ini merupakan lonjakan ketara daripada kedudukan ke-67 dalam penilaian ODIN 2022/23.

OpenDOSM NextGen adalah medium yang menyediakan katalog data dan visualisasi bagi memudahkan pengguna menganalisis pelbagai data dan boleh diakses melalui portal https://open.dosm.gov.my.

***Announcement***

*Malaysia, for the first time, ranked as number one (1) globally in the biennial Open Data Inventory (ODIN) 2024/25 report released by Open Data Watch (ODW), surpassing 197 other countries. This achievement marks a significant leap from its 67$^{th}$ position in the ODIN 2022/23 assessment.*

*OpenDOSM NextGen is a medium that provides data catalogue and visualisations to facilitate users' analysis and can be accessed through https://open.dosm.gov.my.*

**JABATAN PERANGKAAN MALAYSIA**
*DEPARTMENT OF STATISTICS MALAYSIA*

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**MALAYSIA**

| | | |
|---|---|---|
| Tel. | : | 03-8885 7000 |
| Faks | : | 03-8888 9248 |
| Portal | : | https://www.dosm.gov.my |
| Facebook / X / Instagram/ YouTube | : | StatsMalaysia |
| Emel / *E-mail* | : | info@dosm.gov.my (pertanyaan umum/ *general enquiries*)<br>data@dosm.gov.my (pertanyaan & permintaan data/ *data request & enquiries*) |
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## KATA PENGANTAR

Statistik Alam Sekitar, 2025 memaparkan statistik alam sekitar negeri Sabah yang meliputi enam komponen iaitu Keadaan dan Kualiti Alam Sekitar; Sumber Alam Sekitar dan Kegunaannya; Sisa; Kejadian Ekstrem dan Bencana; Penempatan Penduduk dan Kesihatan Persekitaran; dan Penglibatan, Pengurusan dan Perlindungan Alam Sekitar. Penyusunan statistik ini meliputi maklumat dan keadaan alam sekitar, impak aktiviti manusia ke atas alam sekitar dan langkah yang diambil bagi mengurangkan impak tersebut.

Statistik alam sekitar ini boleh digunakan oleh agensi kerajaan negeri, sektor swasta, ahli akademik serta individu sebagai rujukan dalam menjalankan penyelidikan dan penganalisisan di peringkat negeri. Rangka kerja yang digunakan dalam penerbitan ini adalah berdasarkan *Framework for the Development of Environment Statistics* (FDES), *United Nations,* 2013.

Penerbitan ini mengandungi enam bahagian. Bahagian pertama membentangkan infografik statistik alam sekitar, diikuti dengan ringkasan penemuan mengikut komponen di bahagian kedua serta kotak artikel di bahagian ketiga. Bahagian keempat pula memuatkan jadual terperinci mengenai statistik alam sekitar. Lampiran dan glosari disertakan di bahagian kelima dan keenam bagi membantu pengguna memahami statistik dan terma alam sekitar yang digunakan.

Jabatan merakamkan setinggi-tinggi penghargaan atas kerjasama dan sumbangan yang diberikan oleh semua pihak dalam menjayakan penerbitan ini. Setiap maklum balas dan cadangan untuk penambahbaikan penerbitan ini pada masa akan datang amatlah dihargai.

**DATO' SRI DR. MOHD UZIR MAHIDIN**
Ketua Perangkawan Malaysia
Disember 2025

## *PREFACE*

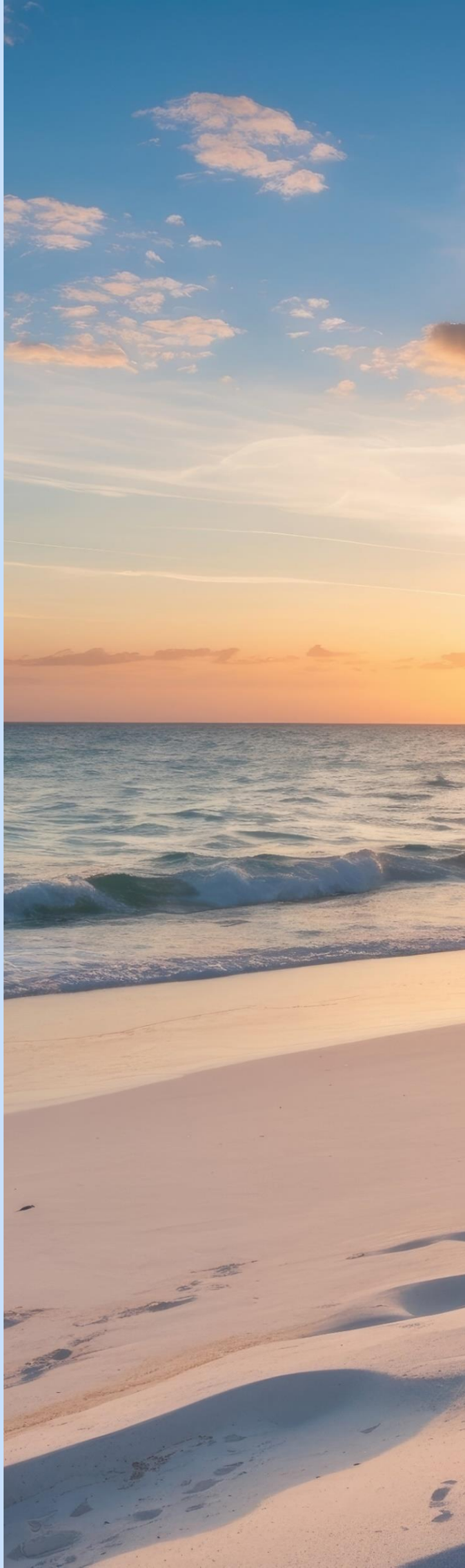
*Environment Statistics, 2025 presents the environment statistics of Sabah which covers six components namely Environmental Conditions and Quality; Environmental Resources and their Use; Residuals; Extreme Events and Disasters; Human Settlements and Environmental Health; and Environmental Protection, Management and Engagement. The compilation of these statistics includes environment state and information, impacts of human activities on the environment and actions taken to minimise the impact.*

*These environment statistics can be used by state government agencies, private sectors, academicians and individuals as a reference to conduct research and analysis at the state level. The framework used in this publication is based on the Framework for the Development of Environment Statistics (FDES), United Nations, 2013.*

*This publication consists of six parts. The first part focused on the infographics of environment statistics, followed by a summary of findings by component in the second part with the article box in the third part. The fourth part contains detailed tables on environment statistics. Appendices and glossary covered in the fifth and sixth parts are to facilitate users in understanding the statistics and environment terms used.*

*The Department gratefully acknowledges the co-operation and contribution rendered by all parties in making this publication a success. Every feedback and suggestion towards improving future publications is highly appreciated.*

***DATO' SRI DR. MOHD UZIR MAHIDIN***
*Chief Statistician Malaysia*
*December 2025*



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*Component 2 Environmental Resources and Their Use*

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**Jadual**
*Table*

**Muka Surat**
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**Komponen** **6** **Penglibatan, Pengurusan dan Perlindungan Alam Sekitar**
*Component* *Environmental Protection, Management and Engagement*

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# INFOGRAFIK

## *INFOGRAPHICS*

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KEMENTERIAN EKONOMI
JABATAN PERANGKAAN MALAYSIA

# STATISTIK ALAM SEKITAR, SABAH 2025

**Hujan (mm)**
2024: 1,708.6 – 3,046.9
2023: 1,429.2 – 3,697.9

**Purata suhu minimum & maksimum (°C)**
2024: 21.7 – 32.7
2023: 21.0 – 32.6

**Kejadian banjir**
2024: 49
2023: 58

Tan metrik

**Buangan terjadual**
2024: 74,392
2023: 44,970

**Buangan klinikal**
2024: 2,681.0
2023: 2,978.0

**Penduduk ('000)**
2025[P] : 3,759.6
2024 : 3,742.0

'000 tan metrik

**Pendaratan ikan laut**
2024: 201.8
2023: 212.8

**Bilangan kes demam denggi**
2024: 5,021
2023: 6,983

Bekalan air mentah Diabstrak (JLH)

**Sungai**
2024: 1,109
2023: 1,060

**Empangan**
2024: 371
2023: 419

Meter padu

**Pengeluaran kayu balak**
2023: 816,287
2022: 1,021,434

**Pengeluaran kayu gergaji**
2023: 217,977
2022: 209,756

**Pengeluaran papan lapis**
2023: 253,997
2022: 344,687

Hektar

**Keluasan hutan yang dilesenkan untuk pengusahasilan**
2023: 24,508
2022: 49,984

**Keluasan berhutan**
2022: 4,606,475
2021: 4,606,475

**Kejadian kebakaran (kes)**
2024: 3,649
2023: 2,474

Nota:
p:awalan
JLH:Juta liter sehari



Sumber: Statistik Alam Sekitar,Sabah, 2025
Jabatan Perangkaan Malaysia (DOSM)

MINISTRY OF ECONOMY
DEPARTMENT OF STATISTICS MALAYSIA

# ENVIRONMENT STATISTICS, SABAH 2025

**Rainfall (mm)**
2024: 1,708.6 – 3,046.9
2023: 1,429.2 – 3,697.9

**Minimum & maximum mean temperature (°C)**
2024: 21.7 – 32.7
2023: 21.0 – 32.6

**Flood incidents**
2024: 49
2023: 58

Metric tonnes

**Scheduled wastes**
2024: 74,392
2023: 44,970

**Clinical wastes**
2024: 2,681.0
2023: 2,978.0

**Population ('000)**
2025[P] : 3,759.6
2024 : 3,742.0

'000 metric tonnes

**Landing of marine fish**
2024: 201.8
2023: 212.8

**Number of dengue fever cases**
2024: 5,021
2023: 6,983

Supply of abstracted raw water (MLD)

**Rivers**
2024: 1,109
2023: 1,060

**Storage dams**
2024: 371
2023: 419

Cubic metres

**Log production**
2023: 816,287
2022: 1,021,434

**Sawn timber production**
2023: 217,977
2022: 209,756

**Plywood production**
2023: 253,997
2022: 344,687

Hectares

**Forest area licensed for harvesting**
2023: 24,508
2022: 49,984

**Forested area**
2022: 4,606,475
2021: 4,606,475

**Fire incidents (cases)**
2024: 3,649
2023: 2,474

Notes:
MLD: Million litres per day
p: preliminary

Source: Environment Statistics, Sabah, 2025
Department of Statistics Malaysia (DOSM)

# RINGKASAN PENEMUAN

## *SUMMARY OF FINDINGS*

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# PENGENALAN

Kepentingan mewujudkan kestabilan alam sekitar harus menjadi tonggak asas kepada strategi pembangunan sesebuah negara. Ia merupakan agenda penting dan strategik dalam memastikan kesejahteraan berterusan masyarakat, bukan sahaja di dalam negara tetapi juga di peringkat global.

Beberapa kejadian akibat kemusnahan alam sekitar, seperti kejadian tanah runtuh tragis yang melibatkan kehilangan nyawa dan suhu yang melampau, memerlukan sebuah negara melaksanakan tindakan proaktif untuk mengurus persekitarannya dengan berhemah dan konsisten. Di samping pencapaian ekonomi, indikator alam sekitar bertindak sebagai kayu pengukur yang penting terhadap kesejahteraan dan kelestarian.

Sabah mengalami pertumbuhan ekonomi yang perlahan pada 2024, Keluaran Dalam Negara Kasar (KDNK) pada harga malar merekodkan RM84.3 bilion (2023: RM83.4 bilion), menunjukkan peningkatan 1.1 peratus daripada tahun sebelumnya. KDNK Sabah menyumbang 5.1 peratus kepada keseluruhan KDNK Malaysia. Selain itu, KDNK per kapita pada harga semasa menurun kepada RM30,607 berbanding RM31,235 pada 2023. **[Paparan 1.1]**

Paparan 1.1: Ringkasan Ekonomi Negeri Sabah, 2023 dan 2024

| | 2023[a] | 2024[p] |
|---|---|---|
| KDNK pada harga malar 2015 | RM83.4 bilion | RM84.3 bilion |
| Perubahan peratusan tahunan | 1.4 % | 1.1 % |
| Peratusan sumbangan kepada KDNK Malaysia | 5.3 % | 5.1 % |
| KDNK per kapita pada harga semasa | RM31,235 | RM30,607 |

Nota: [a] anggaran
[p] awalan

## A. Kualiti alam sekitar

Bahan pencemar udara merupakan bahan kimia di udara yang boleh membahayakan manusia dan alam sekitar. Bahan pencemar boleh berbentuk zarah pepejal, titisan cecair atau gas. Terdapat enam bahan pencemar udara utama iaitu Ozon Permukaan Bumi ($O_3$), Karbon Monoksida (CO), Sulfur Dioksida ($SO_2$), Nitrogen Dioksida ($NO_2$) dan Habuk Halus ($PM_{10}$ & $PM_{2.5}$). Pencemaran udara berlaku apabila bahan pencemar ini hadir di atmosfera. Punca dan kesan bahan pencemar udara ditunjukkan seperti di **Lampiran 2**.

### Habuk Halus ($PM_{10}$ & $PM_{2.5}$)

Habuk Halus ($PM_{10}$ & $PM_{2.5}$) adalah istilah yang digunakan bagi zarah terampai berukuran kurang daripada diameter 10 dan 2.5 mikron. Zarah boleh berbentuk pepejal atau cecair dan ia termasuk aerosol, debu, asap dan debunga. Pembebasan $PM_{10}$ dari ekzos kenderaan bermotor, penjanaan kuasa dan haba, proses perindustrian dan aktiviti pembakaran terbuka yang akan membawa kepada pencemaran udara serta mengancam kesihatan manusia dan tumbuhan.

Trend purata tahunan kepekatan $PM_{2.5}$ dalam udara di Sabah menunjukkan peningkatan di semua stesen kecuali stesen Keningau pada 2024. Manakala, kepekatan $PM_{10}$ juga mencatatkan peningkatan di semua stesen kecuali di stesen Kota Kinabalu berbanding 2023. **[Paparan 1.2]**

### Ozon Permukaan Bumi ($O_3$)

$O_3$ adalah bahan pencemar yang terjadi akibat daripada reaksi kimia dalam udara di antara sebatian organik meruap (VOCs) dan nitrogen oksida (NOx). VOCs dan NOx ini dihasilkan oleh punca kenderaan bermotor dan industri.

Trend purata tahunan kepekatan $O_3$ dalam udara menurun di semua stesen di Sabah pada 20224 berbanding pada 2023 kecuali di stesen Kota Kinabalu kekal tidak berubah. **[Paparan 1.2]**

**Karbon Monoksida (CO)**

CO merupakan gas yang tidak berwarna, tidak berbau dan beracun yang dihasilkan dari punca pembakaran bahan bakar fosil seperti asap kenderaan, proses perindustrian dan aktiviti pembakaran terbuka.

Trend purata tahunan kepekatan CO pada 2024 menunjukkan peningkatan di semua stesen kecuali di stesen Keningau yang mencatatkan penurunan berbanding tahun sebelumnya. **[Paparan 1.2]**

**Sulfur Dioksida ($SO_2$)**

$SO_2$ adalah sejenis gas reaktif yang mudah larut dalam air, tidak berwarna dan mempunyai bau yang tidak menyenangkan. $SO_2$ yang dilepaskan ke alam sekitar berasal daripada utiliti elektrik, terutamanya yang membakar arang batu. Beberapa sumber $SO_2$ lain termasuk kilang penapisan petroleum, pembuatan simen dan kemudahan peleburan dan pemprosesan logam. Pendedahan yang berlebihan terhadap kepekatan tinggi $SO_2$ di udara menyebabkan kerosakan sistem pernafasan dan komplikasi kardiovaskular.

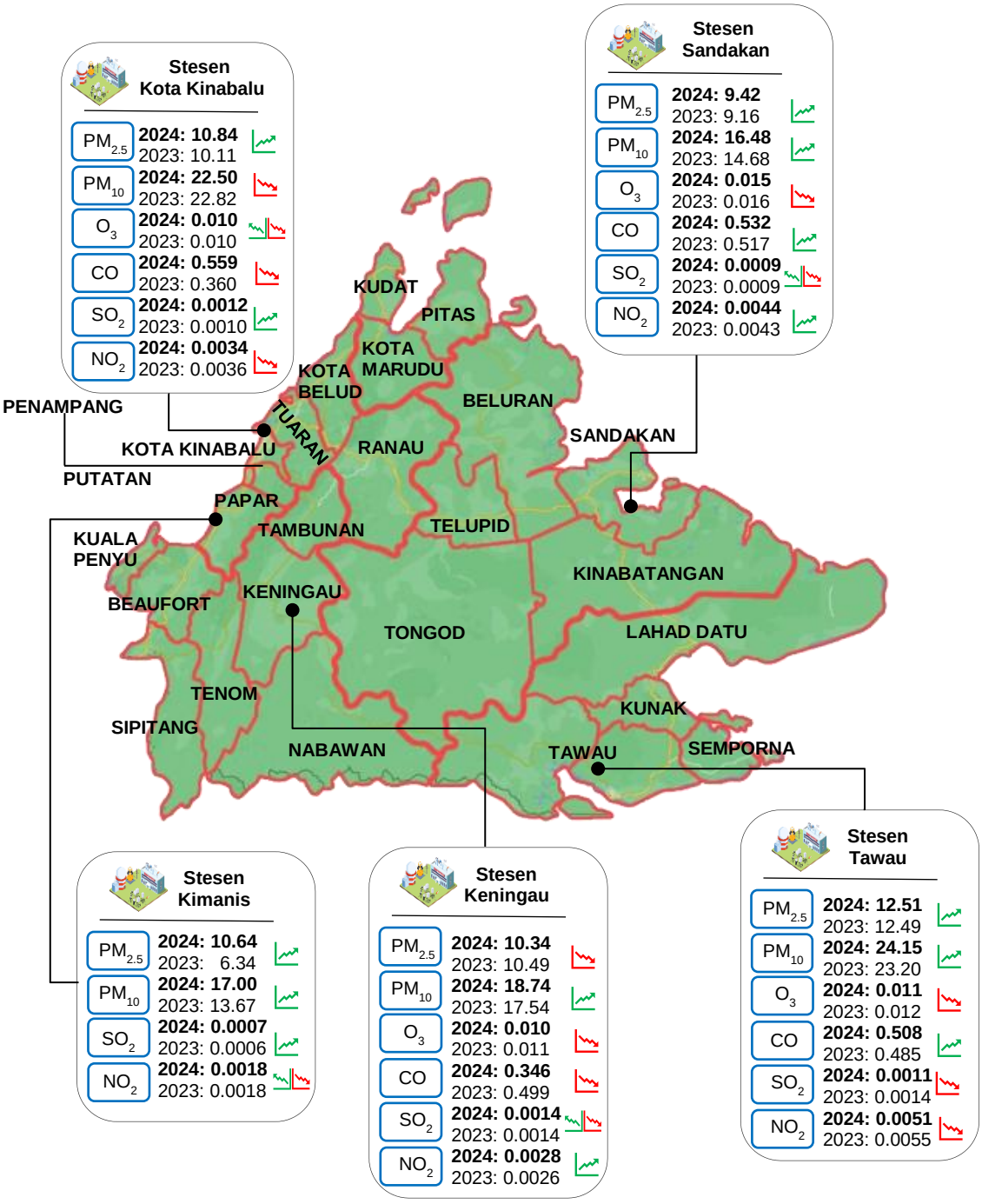
Trend purata tahunan kepekatan $SO_2$ pada 2024 menurun di stesen Tawau dan kekal tidak berubah di stesen Keningau dan Sandakan. Manakala, stesen Kimanis dan Kota Kinabalu mencatatkan peningkatan berbanding 2023. **[Paparan 1.2]**

**Nitrogen Dioksida ($NO_2$)**

$NO_2$ terbentuk di persekitaran udara melalui pengoksidaan Nitrogen Monoksida (NO). Gas bertoksik ini berwarna merah keperangan dan mempunyai bau yang kuat dan tajam.

Trend purata tahunan kepekatan $NO_2$ dalam udara pada 2024 meningkat di dua stesen iaitu stesen Keningau dan Sandakan. Manakala, stesen Kota Kinabalu dan Tawau mencatatkan penurunan dan kekal tidak berubah di stesen Kimanis. **[Paparan 1.2]**

Paparan 1.2: Ringkasan statistik bahan pencemar udara mengikut stesen, Sabah, 2023 dan 2024




**Sumber: Jabatan Alam Sekitar**

## B. Purata suhu, hujan dan purata kelembapan relatif

Iklim Malaysia dikategorikan sebagai iklim khatulistiwa yang mempunyai suhu seragam, hujan yang banyak dan lembap sepanjang tahun. Iklim ini dipengaruhi oleh monsun Timur Laut yang bertiup dari bulan November hingga Mac dan monsun Barat Daya dari Mei hingga September. Pantai timur Semenanjung Malaysia dan kawasan pesisiran pantai Sabah dan Sarawak amat dipengaruhi oleh musim monsun Timur Laut. Manakala, pantai barat Semenanjung Malaysia tidak dipengaruhi kerana dilindungi oleh banjaran gunung yang tinggi.

Sabah mempunyai enam stesen meteorologi yang digunakan untuk memantau keadaan cuaca secara berterusan dan menyediakan data meteorologi sebagai input untuk ramalan cuaca. Stesen-stesen tersebut adalah Keningau, Kota Kinabalu, Kudat, Ranau, Sandakan dan Tawau.

### Purata suhu

Stesen Kota Kinabalu mencatatkan purata suhu tertinggi iaitu 32.7°C, meningkat 0.1°C berbanding 32.6°C pada 2023. Manakala, stesen Ranau merekodkan purata suhu terendah iaitu 21.7°C, berbanding 21.0°C yang direkodkan pada 2023.

### Taburan hujan

Stesen Kota Kinabalu merekodkan hujan tahunan tertinggi pada 2024 iaitu 3,046.9 mm berbanding tahun sebelumnya (2,161.9 mm). Namun begitu, Stesen Keningau pula mencatatkan hujan tahunan terendah iaitu 1,708.6 mm pada 2024 berbanding tahun sebelumnya (1,429.2 mm).

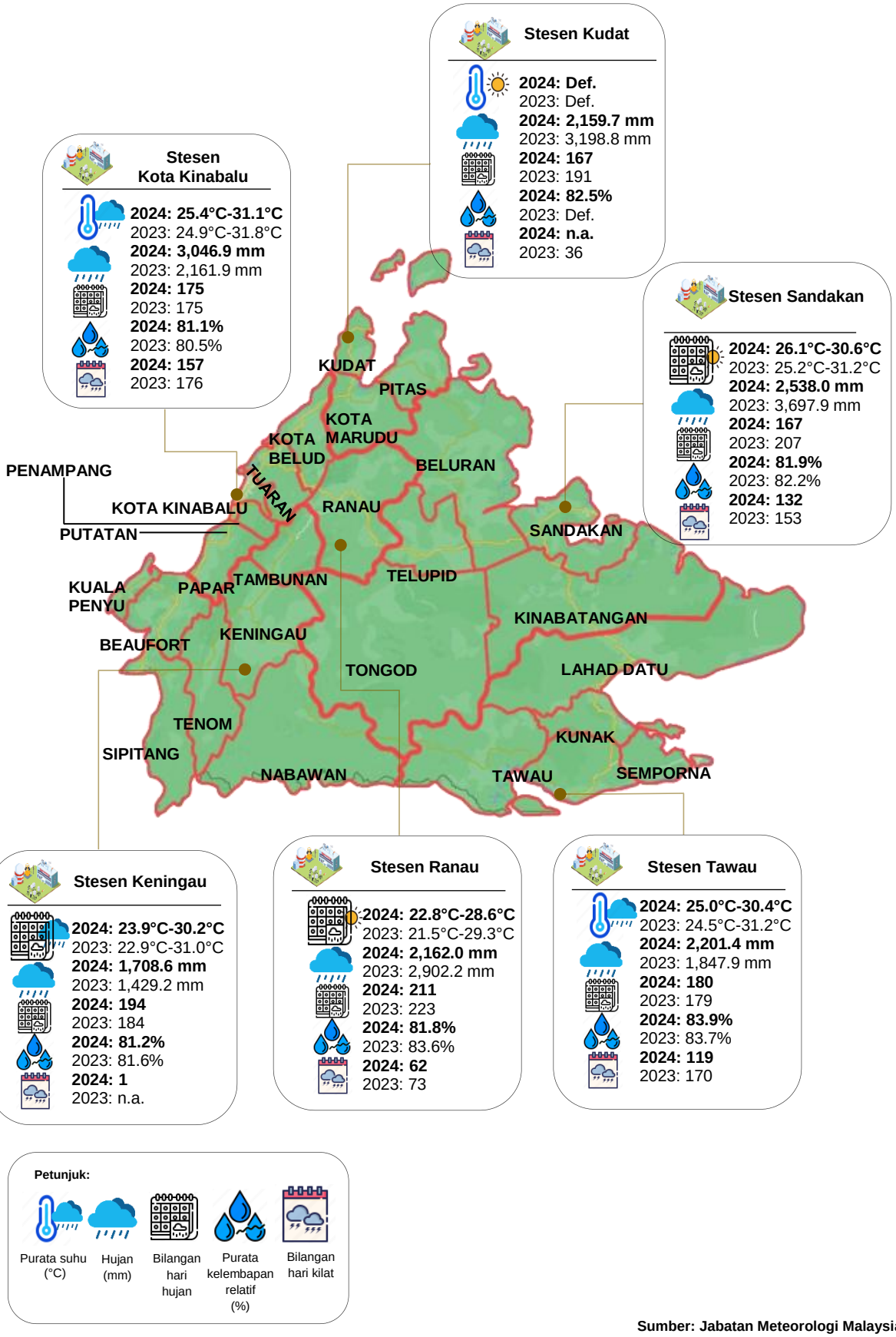
### Purata kelembapan relatif

Purata kelembapan relatif di Sabah adalah di antara 81.1 peratus (stesen Kota Kinabalu) dan 83.9 peratus (stesen Tawau) pada 2024. Julat purata kelembapan relatif pada 2023 antara 80.5 peratus (stesen Kota Kinabalu) dan 83.7 peratus (stesen Tawau).

### Bilangan hari kilat

Stesen Kota Kinabalu mencatatkan bilangan hari kilat tertinggi pada 2024 dengan 157 hari. Manakala, stesen Keningau pula mencatatkan bilangan hari kilat terendah iaitu 1 hari. **[Paparan 1.3]**

Paparan 1.3: Ringkasan statistik iklim di stesen meteorologi, Sabah, 2023 dan 2024




**Sumber: Jabatan Meteorologi Malaysia**

## C. Status kualiti udara

Udara merupakan campuran beberapa gas yang membentuk atmosfera bumi. Ia terhasil terutamanya daripada nitrogen (lebih kurang 78.0%), oksigen (lebih kurang 21.0%) dan gas-gas lain (lebih kurang 1.0%). Udara amat penting dalam kehidupan di mana kita menggunakannya untuk bernafas dan juga untuk pembakaran bahan api bagi tujuan pemanasan, pengangkutan, penjanaan kuasa dan lain-lain.

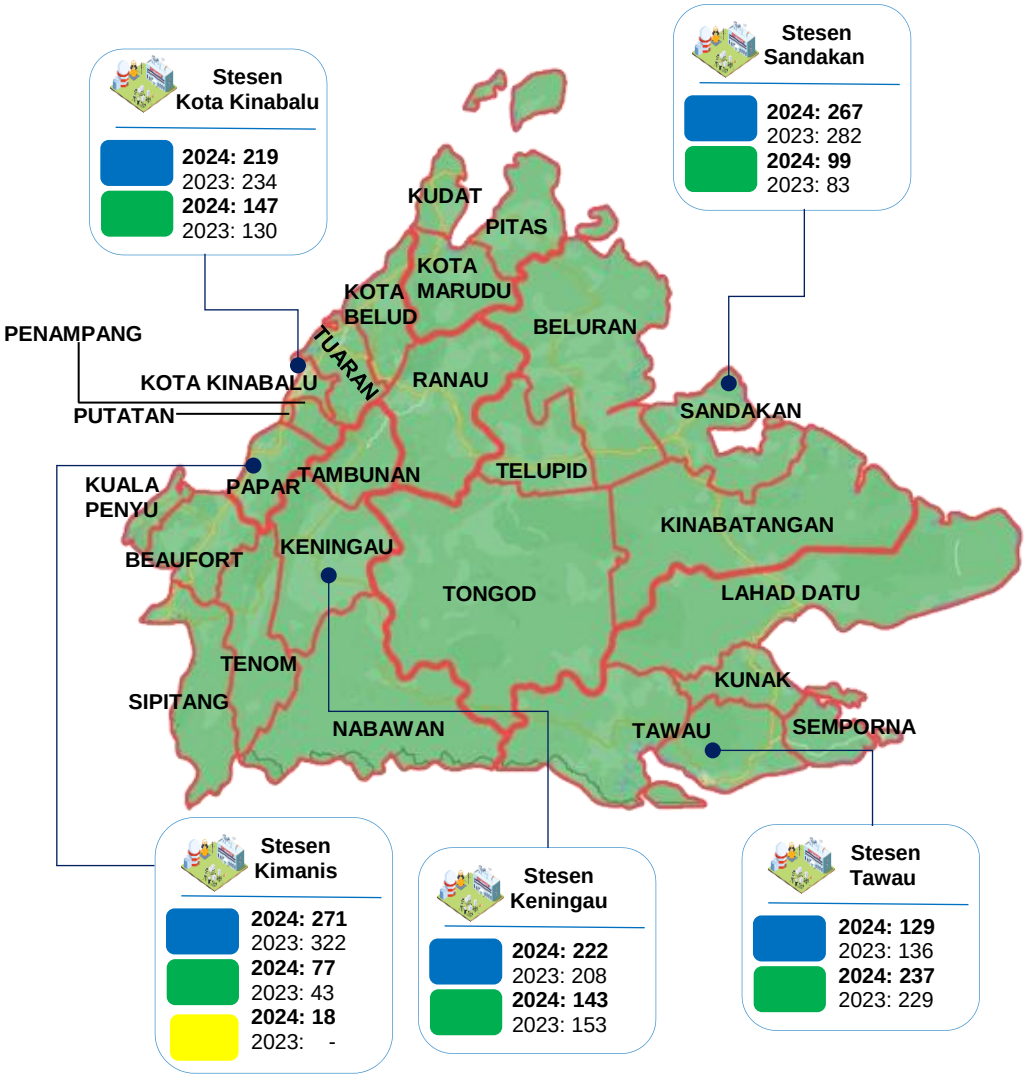
### Indeks Pencemaran Udara

Jabatan Alam Sekitar (JAS) memantau kualiti udara negara melalui 65 stesen pengawasan yang ditempatkan di seluruh negara bagi mengawasi dan mengesan sebarang perubahan kualiti udara yang boleh memberi kesan negatif kepada kesihatan manusia dan alam sekitar. Status kualiti udara di Malaysia dilaporkan dalam Indeks Pencemaran Udara (IPU).

Bahan pencemar udara yang digunakan untuk mengira IPU adalah Ozon permukaan Bumi ($O_3$), Karbon Monoksida (CO), Nitrogen Dioksida ($NO_2$), Sulfur Dioksida ($SO_2$) dan Habuk Halus bersaiz kurang dari 10 mikron ($PM_{10}$) dan bersaiz kurang dari 2.5 mikron ($PM_{2.5}$).

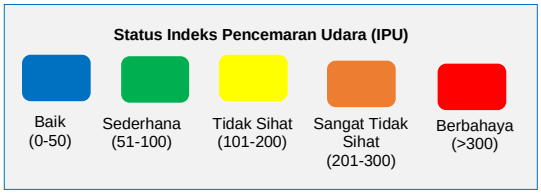
Semua stesen di Sabah mencatatkan kualiti udara “baik” melebihi 100 hari pada 2024. Stesen Kimanis mencatatkan bilangan hari tertinggi (271 hari) dengan “baik” kualiti udara berbanding 322 hari pada 2021. Bacaan IPU menunjukkan penurunan paras pencemar udara, khususnya di bandar-bandar utama di seluruh negeri disebabkan pelepasan bahan pencemar ke udara yang lebih rendah seperti asap kenderaan bermotor, pelepasan asap cerobong industri dan aktiviti pembakaran terbuka. **[Paparan 1.4]**

Paparan 1.4: Status kualiti udara mengikut stesen, Sabah, 2023 dan 2024




Nota:
1. Bacaan status kualiti udara berdasarkan bacaan maksimum harian
2. Stesen yang tidak mencukupi 365 hari adalah disebabkan masalah teknikal

Unit pengukuran: bilangan hari




**Sumber: Jabatan Alam Sekitar**

## D. Hutan

Hutan adalah salah satu komponen penting dalam sistem biofizikal Malaysia. Iklim dan keadaan tanah yang sesuai menggalakkan pertumbuhan hutan hujan tropika, terutamanya spesies hutan tanah rendah dan hutan dipterokarpa bukit. Hutan dianggap sebagai penyaman udara yang besar, menapis hujan dan menghalang hakisan tanah yang teruk. Ia juga berperanan sebagai span besar yang menyerap, menyimpan dan menyalurkan kembali air dengan perlahan ke sungai serta laluan air. Hutan turut membekalkan produk balak serta menjadi gedung tanaman ubatan dan kawasan simpanan pelbagai biologi. Pengelasan hutan dikategorikan mengikut perubahan ciri-ciri altitud, komposisi flora, habitat, iklim, tanah dan biotik.

### Kawasan berhutan

Kawasan berhutan diklasifikasikan sebagai hutan simpanan kekal, tanah kerajaan,taman hidupan liar dan hutan lain yang terdiri daripada beberapa jenis hutan seperti hutan darat, hutan paya gambut dan hutan paya laut.

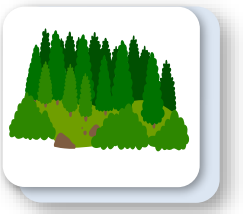
Sabah merupakan negeri kedua terbesar di Malaysia yang mempunyai kawasan berhutan dengan keluasan 4,606,475 hektar. Daripada jumlah ini, 3,574,468 hektar (77.6%) telah diwartakan sebagai Hutan Simpanan Kekal (HSK) di bawah Akta Enakmen Hutan 1968 dan Peraturan Hutan 1969. Kawasan HSK ini diuruskan di bawah prinsip pengurusan hutan secara berkekalan untuk kepentingan ekonomi, sosial dan alam sekitar. **[Paparan 1.5]**

### Pengusahasilan hutan

Aktiviti pengusahasilan hutan merujuk kepada pengambilan dan pengeluaran hasil hutan dan seterusnya menyumbang kepada perkembangan dan pertumbuhan sosio ekonomi. Aktiviti pengusahasilan hutan dikawal melalui perundangan, dasar dan garis panduan pengoperasian. Keluasan hutan yang dilesenkan untuk pengusahasilan bagi negeri Sabah menurun kepada 24,508 hektar pada 2023 daripada 49,984 hektar pada 2022. **[Paparan 1.6]**

Paparan 1.5: Kawasan berhutan dan Hutan Simpanan Kekal, Sabah, 2021 dan 2022

(Hektar)



| Kawasan berhutan | Hutan Simpanan Kekal |
|---|---|
| **2022: 4,606,475** | **2022: 3,574,468** |
| 2021: 4,606,475 | 2021: 3,574,468 |

**Sumber: Jabatan Perhutanan Sabah**

Paparan 1.6: Keluasan hutan yang dilesenkan untuk pengusahasilan, Sabah, 2022 dan 2023

(Hektar)

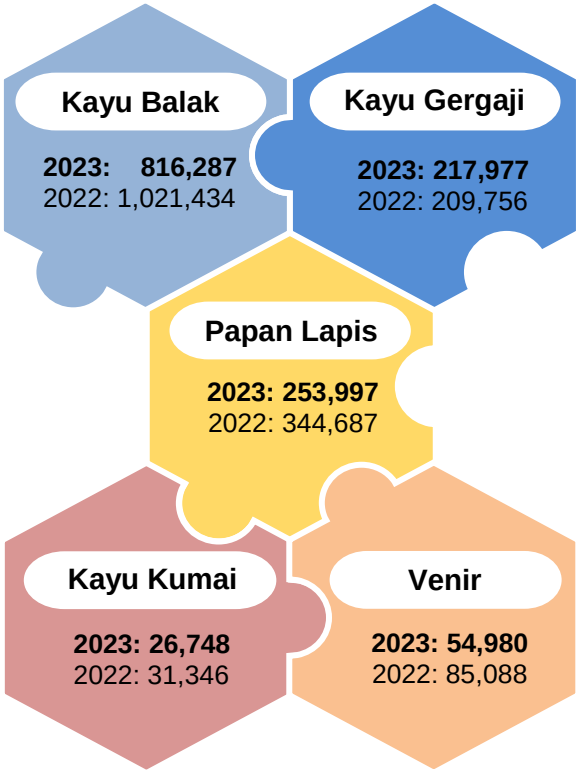
**2023: 24,508**
2022: 49,984

**Sumber: Jabatan Perhutanan Sabah**

Kayu balak merupakan salah satu produk kayu-kayan utama di Sabah. Pengeluaran kayu balak yang direkodkan pada 2023 menurun kepada 816,287 $m^3$ berbanding 1,021,434 $m^3$ pada 2022. **[Paparan 1.7]**

Paparan 1.7: Pengeluaran produk kayu-kayan utama, Sabah, 2022 dan 2023

(Meter padu)




**Sumber: Jabatan Perhutanan Semenanjung Malaysia**

## E. Sumber biologi

Laut Malaysia adalah antara perairan yang mempunyai kepelbagaian biologi di dunia, dengan pelbagai jenis ekosistem dan sumber semula jadi yang penting kepada kehidupan dan keperluan pemakanan manusia.

Pendaratan ikan laut pada 2024 ialah 201.8 ribu tan metrik, menurun 5.2 peratus berbanding 212.8 ribu tan metrik pada 2023. **[Paparan 1.8]**

Paparan 1.8: Pendaratan ikan laut, Sabah, 2023 dan 2024

('000 tan metrik)

**2024: 201.8**
2023: 212.8

**-5.2 %**

Kadar pertumbuhan (%)

**Sumber: Jabatan Perikanan Malaysia**

## F. Buangan klinikal

Buangan klinikal pula merujuk kepada buangan yang terdiri daripada keseluruhan atau sebahagian tisu manusia, darah atau bendalir badan, bahan kumuh, ubat-ubatan, produk farmaseutikal dan lain-lain. Ia diklasifikasikan sebagai buangan terjadual di bawah Jadual Pertama Peraturan Kualiti Alam Sekeliling (Buangan Terjadual), 2005.

Sabah mencatatkan 2,681.0 tan metrik buangan klinikal pada 2024 berbanding 2,978.0 tan metrik yang direkodkan pada 2023. **[Paparan 1.9 ]**

Paparan 1.9: Kuantiti buangan klinikal, Sabah, 2023 dan 2024

(Tan metrik)

**Buangan klinikal**

**2024: 2,681.0**
2023: 2,978.0

**-10.0%**

Kadar pertumbuhan (%)

**Sumber: Jabatan Alam Sekitar**

# INTRODUCTION

*The importance of establishing environmental stability should be a fundamental pillar of a country's development strategy. It's a crucial and strategic agenda in ensuring continuous well-being of the community, not only within the nation but also globally.*

*Several events resulting from environmental destruction, such as tragic landslide incidents involving lost of lives and extreme temperatures, necessitate that a country implements proactive action to manage its environment with prudence and consistency. Aside from economic achievement, environment indicator serves as an important measurement towards well-being and sustainability.*

*Sabah experienced marginal economic growth in 2024, Gross Domestic Product (GDP) at constant prices recorded RM84.3 billion (2023: RM83.4 billion), indicating a 1.1 per cent increase from the previous year. Sabah's GDP contributes 5.1 per cent to Malaysia's overall GDP. Additionally, the GDP per capita at current prices decrease to RM30,607 as compared to RM31,235 in 2023.* ***[Exhibit 1.1]***

*Exhibit 1.1: Economic Summary of Sabah, 2023 and 2024*

| | 2023[e] | 2024[p] |
|---|---|---|
| GDP at constant price 2015 | RM83.4 billion | RM84.3 billion |
| Annual percentage change | 1.4 % | 1.1 % |
| Percentage contribution to Malaysia's GDP | 5.3 % | 5.1 % |
| GDP per capita at current price | RM31,235 | RM30,607 |

Notes: [e] estimates
[p] preliminary

## A. Environmental quality

*Air pollutants are chemical substances in the air that can be harmful to human beings and the environment. Pollutants can be in the form of solid particles, liquid droplets or gases. There are six primary pollutants namely Ground Level Ozone ($O_3$), Carbon Monoxide (CO), Sulphur Dioxide ($SO_2$), Nitrogen Dioxide ($NO_2$) and Particulate Matter ($PM_{10}$ & $PM_{2.5}$). Air pollution occurs when these pollutants are present in the atmosphere. The sources and effects of air pollutants are shown in* ***Appendix 2****.*

### *Particulate Matter ($PM_{10}$ & $PM_{2.5}$)*

*Particulate Matter ($PM_{10}$ & $PM_{2.5}$) is the term used to describe respirable particles of less than 10 and 2.5 microns in diameter. Particles may be solid or liquid and include aerosol, dust, smoke and pollen. Emission of $PM_{10}$ from motor vehicle exhausts, heat and power generation, industrial processes and open burning activities will lead to air pollution and endanger human health and plants.*

*The annual average trend concentration of $PM_{2.5}$ in Sabah showed an increased at all stations except at Keningau station in 2024. Meanwhile, $PM_{10}$ concentration also recorded an increased at all stations except a Kota Kinabalu station as compared to 2023.* ***[Exhibit 1.2]***

### *Ground Level Ozone $O_3$*

*$O_3$ is a pollutant formed by the chemical reaction in the air between volatile organic compounds (VOCs) and nitrogen oxide (NOx). These VOCs and NOx are produced by motor vehicles and industrial sources.*

*The annual average trend concentration of $O_3$ in the air decreased in all stations in Sabah in 2024 as compared to 2023 except at Keningau station remained unchanged.* ***[Exhibit 1.2]***

***Carbon Monoxide (CO)***

*CO is a colourless, odourless and toxic gas produced from fossil fuel combustion sources such as vehicle exhaust, industrial processes and open burning activities.*

*The annual average trend concentration of CO in 2024 showed an increase at all stations except at Keningau station that recorded a decrease as compared to the previous year.* ***[Exhibit 1.2]***

***Sulphur Dioxide ($SO_2$)***

*$SO_2$ is a colourless, water-soluble reactive gas with an unpleasant odour. $SO_2$ released into the environment comes from electric utilities, especially those that burn coal. Some other sources of $SO_2$ include petroleum refineries, cement manufacturing and metal smelting and processing facilities. Excessive exposure to high concentration of $SO_2$ in the atmosphere causes respiratory illnesses and cardiovascular complications.*

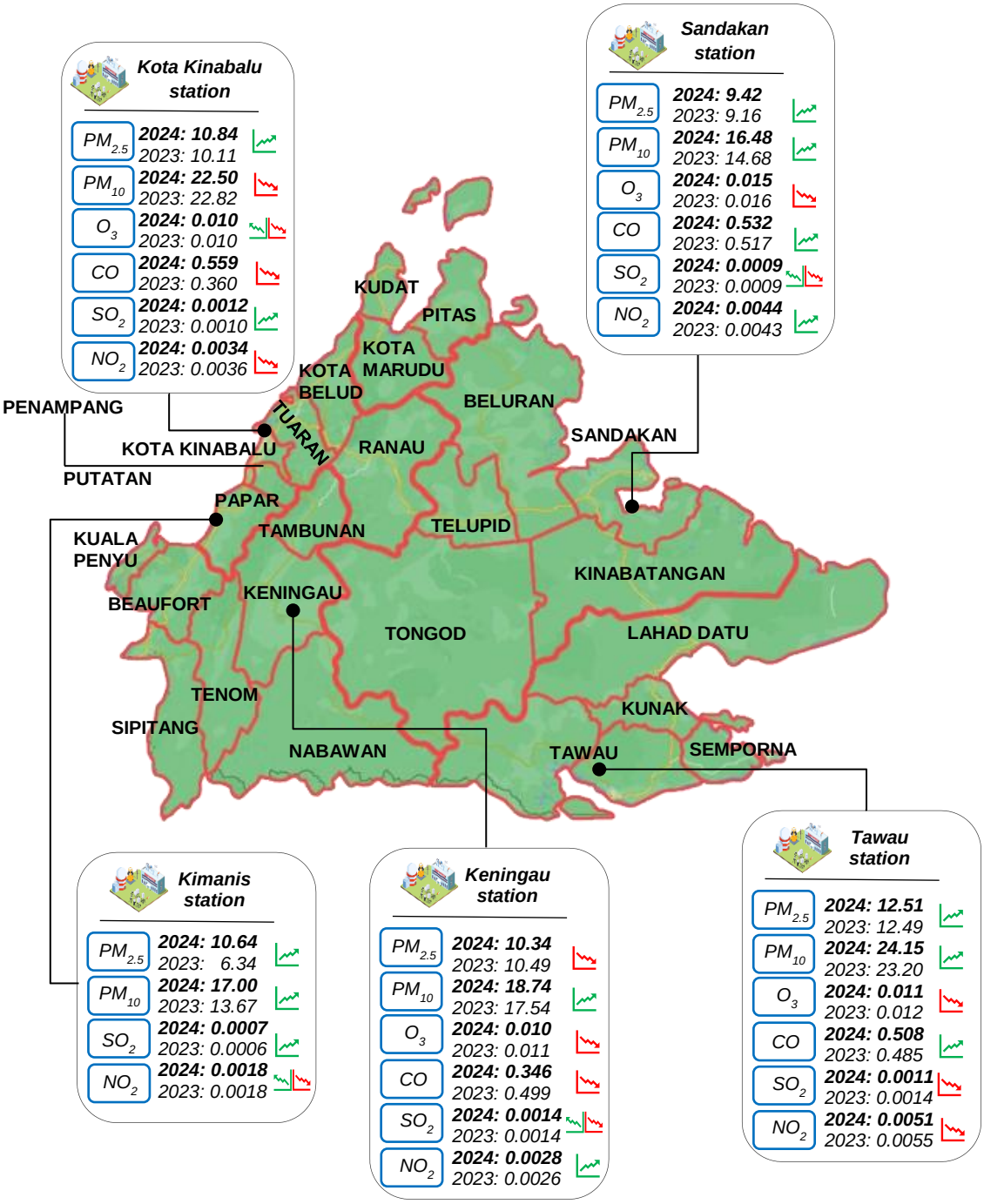
*The annual average trend concentration of $SO_2$ in 2024 decrease at Tawau station and remain unchanged at Keningau and Sandakan stations. Meanwhile, Kimanis and Kota Kinabalu stations recorded an increased as compared to 2023.* ***[Exhibit 1.2]***

***Nitrogen Dioxide ($NO_2$)***

*$NO_2$ is formed in the ambient air through the oxidation of Nitrogen Monoxide (NO). This reddish-brown toxic gas has a sharp and pungent odour.*

*The annual average trend concentration of $NO_2$ in the air in 2024 increased at two stations namely Keningau and Sandakan stations. Meanwhile, Kota Kinabalu and Tawau stations recorded a decrease and remain unchanged at Kimanis station.* ***[Exhibit 1.2]***

*Exhibit 1.2: Summary of air pollutants statistics by station, Sabah, 2023 and 2024*




**Source: Department of Environment**

## B. Mean temperature, rainfall and mean relative humidity

*Malaysia's climate is categorised as equatorial, has a uniform temperature, copious rainfall and humid throughout the year. This climate is influenced by the Northeast monsoon blows from November to March and the Southwest monsoon from May to September. The east coast of Peninsular Malaysia and the coastal areas of Sabah and Sarawak are strongly influenced by the Northeast monsoon season. However, the west coast of Peninsular Malaysia is not affected because it is protected by the soaring mountain ranges.*

*Sabah has six meteorological stations which used to monitor the weather conditions continuously and provide meteorological data as an input for weather forecasting. The stations are Keningau, Kota Kinabalu, Kudat, Ranau, Sandakan and Tawau.*

### Mean temperature

*Kota Kinabalu station recorded the highest mean temperature of 32.7°C, an increase of 0.1°C compared to 32.6°C in 2023. Meanwhile, Ranau station recorded the lowest mean temperature of 21.7°C, as compared to 21.0°C recorded in 2023.*

### Rainfall distribution

*Kota Kinabalu station recorded the highest annual rainfall in 2024 with 3,046.9 mm as compared to the previous year (2,161.9 mm). However, Keningau station recorded the lowest annual rainfall of 1,708.6 mm in 2024 as compared to the previous year (1,429.2 mm).*

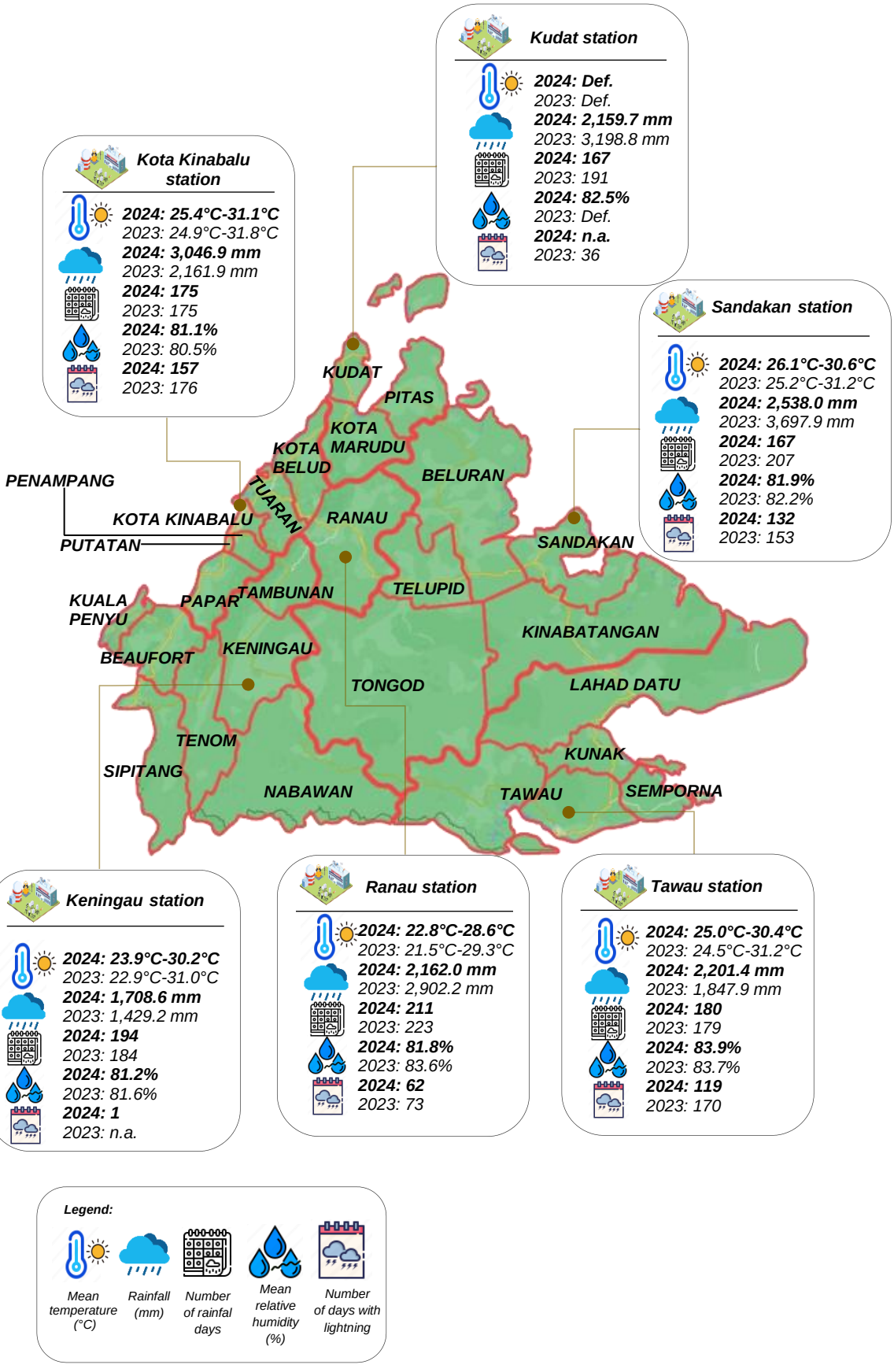
### Mean relative humidity

*The mean relative humidity in Sabah was between 81.1 per cent (Kota Kinabalu station) and 83.9 per cent (Tawau station) in 2024. The mean relative humidity range in 2023 was between 80.5 per cent (Kota Kinabalu station) and 83.7 per cent (Tawau station).*

### Number of days with lightning

*Kota Kinabalu station recorded the highest number of lightning days in 2024 with 157 days. Meanwhile, Keningau station recorded the lowest number of lightning days at 1 day.* ***[Exhibit 1.3]***

*Exhibit 1.3: Summary of climate statistics at meteorological stations, Sabah, 2023 and 2024*




**Source: Malaysia Meteorological Department**

## C. Air quality status

*Air is the mixture of gases which make up the earth's atmosphere. It is mainly composed of nitrogen (about 78.0%), oxygen (about 21.0%) and other gases (about 1.0%). Air is essential for life for breathing as well as to burn fuels for heating, transportation, power generation and others.*

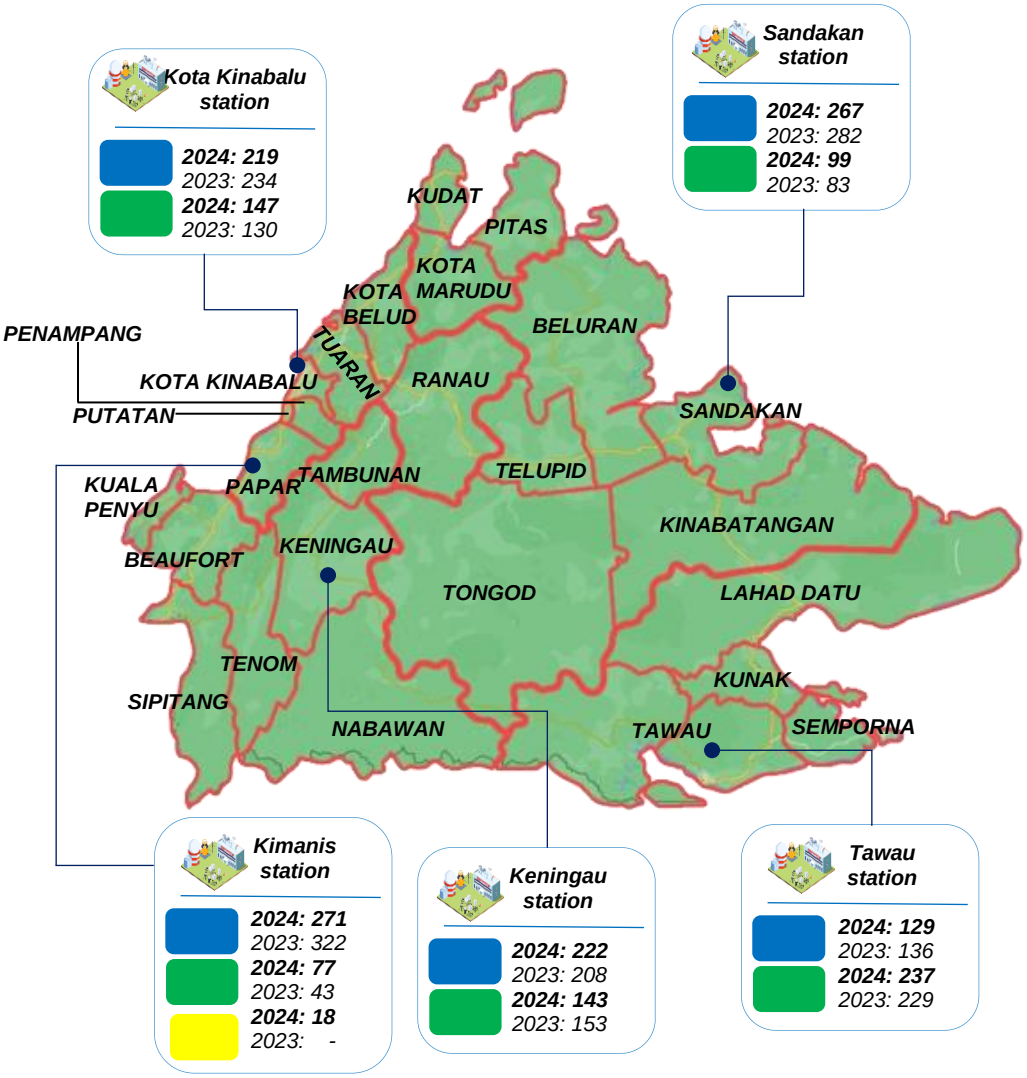
### Air Pollutant Index

*The Department of Environment (DOE) monitors the country's ambient air quality through 65 monitoring stations that are located throughout the country to monitor and detect any significant change in the air quality that can contribute to the negative impact on human health and environment.The status of air quality in Malaysia is reported as the Air Pollutant Index (API).*

*The air pollutants used in computing the API are Ozone ($O_3$), Carbon Monoxide (CO), Nitrogen Dioxide ($NO_2$) Sulphur Dioxide ($SO_2$), Particulate Matter of less than 10 microns in size ($PM_{10}$) and Particulate Matter of less than 2.5 microns in size ($PM_{2.5}$).*

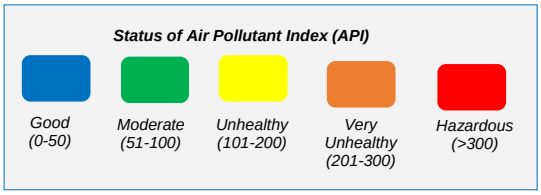
*All stations in Sabah registered more than 100 days of "good" air quality in 2024. Kimanis station registered the highest number of days (271 days) with "good" air quality as compared to 322 days in 2023. API reading showed a decrease in air pollutants levels, especially in major cities across the state due to lower air pollutant emissions such as motor vehicles smoke, industrial chimney emissions and open burning activities.* ***[Exhibit 1.4]***

## Exhibit 1.4: Status of air quality by station, Sabah, 2023 and 2024




*Notes:*
*1. Air quality status readings are based on daily maximum readings*
*2. Stations with inadequate 365 days is due to technical problem*

*Measurement unit: number of days*




***Source: Department of Environment***

## D. Forest

*Forests are one of the important components in Malaysia's biophysical system. Suitable climate and soil conditions encourage the growth of tropical rainforests, especially lowland forest species and hill dipterocarp forests. Forests are considered a large air filters, filtering rain and preventing severe soil erosion. It also acts as a large sponge that absorbs, stores and slowly returns water to rivers and waterways. Forests also supply timber products as well as being a storehouse of medicinal plants and storage areas for various biology. Forest classification is categorised according to changes in altitude, flora composition, habitat, climate, soil and biotic characteristics.*

### Forested area

*Forested areas are classified as a permanent reserve forests, government land, wildlife parks and other forests consisting of several types such as terrestrial forests, peat swamp forests and marine swamp forests.*

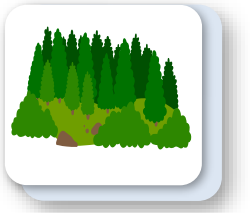
*Sabah is the second largest state in Peninsular Malaysia with a forested area of 4,606,475 hectares. Of this total, 3,574,468 hectares (77.6%) have been gazetted as Permanent Forest Reserve (PFR) under Forest Enactment 1968 and Forest Rules 1969. These PFR areas are managed under the principle of sustainable forest management for economic, social and environmental benefits.* ***[Exhibit 1.5]***

### Forestry production

*Forest exploitation activities refer to the collection and production of forest products and further contribute to the development and socio-economic growth. Forest exploitation activities are regulated through legislation, policies and operating guidelines. The area of forest licensed for logging for the state of Sabah decreased to 24,508 hectares in 2023 from 49,984 hectares in 2022.* ***[Exhibit 1.6]***

*Exhibit 1.5: Forested and Permanent Reserve Forest, Sabah, 2021 and 2022*

*(Hectares)*



| Forested area | Permanent Reserve Forest |
|---|---|
| ***2022: 4,606,475*** | ***2022: 3,574,468*** |
| *2021: 4,606,475* | *2021: 3,574,468* |

*Exhibit 1.6: Forest area licensed for harvesting, Sabah, 2022 and 2023*

*(Hectares)*

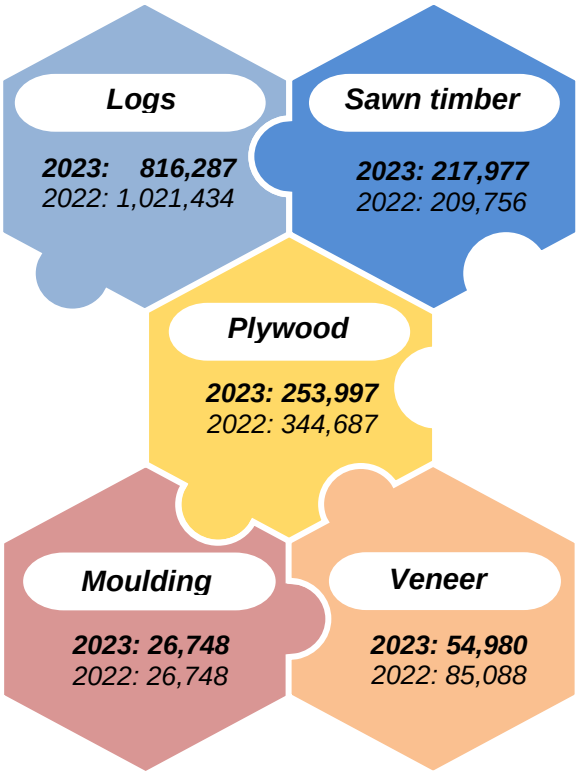
***2023: 24,508***
*2022: 49,984*

***Source: Sabah Forestry Department***

*Logs timber is one of the main timber products in Sabah. Logs timber production recorded in 2023 decreased to 816,287 m³ as compared to 1,021,434 m³ in 2022.* ***[Exhibit 1.7]***

*Exhibit 1.7: Production of major timber products, Sabah, 2022 and 2023*

*(Cubic metres)*




***Source: Forestry Department Peninsular Malaysia***

## *E. Biological resources*

*Malaysia's sea are among the most diversified biologically in the world, with a variety of ecosystems and natural resources which are important to the livelihood and sustenance to human.*

*The landing of marine fish in 2024 was 201.8 thousand metric tons, a decreased of 5.2 per cent as compared to 212.8 thousand metric tonnes in 2023.* ***[Exhibit 1.8]***

*Exhibit 1.8: Landings of marine fish, Sabah, 2023 and 2024*

*('000 metric tonnes)*

***2024: 201.8***
*2023: 212.8*

***-5.2 %***

*Growth rate (%)*

***Source: Department of Fisheries***

## *F. Clinical wastes*

*Clinical wastes refers to any waste which consists wholly or partly of human tissues, blood or body fluids, excretions, drugs or pharmaceutical products and others. It is classified as scheduled wastes under the First Schedule Environmental Quality (Scheduled Wastes) Regulations, 2005.*

*Sabah recorded 2,681.0 metric tonnes of clinical wastes in 2024 as compared to 2,978.0 metric tonnes recorded in 2023.* ***[Exhibit 1.9]***

*Exhibit 1.9: Quantity of clinical wastes, Sabah, 2023 and 2024*

*(Metric tonnes)*

***Clinical wastes***

***2024: 2,681.0***
*2023: 2,978.0*
***-10.0%***

*Growth rate (%)*

***Source: Department of Environment***

# ARTIKEL

# *ARTICLE*

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## Implikasi Cuaca kepada Pengeluaran Sayur-sayuran di Sabah

Siti Nur Syafiqah Mohd Zulkiflee, Syed Ibrahim Mohd Jamaluddin, Latifah Mohamed Shah

Sektor pertanian Malaysia menjadi teras dalam kestabilan bekalan makanan dan antara komponen penting dalam ekonomi negara, sektor ini beroperasi dalam iklim khatulistiwa yang sebelum ini mempunyai pola cuaca yang relatif konsisten dan dapat dijangka. Walaupun keadaan ini secara umumnya sesuai untuk aktiviti pertanian, perubahan cuaca dan corak cuaca yang tidak menentu sejak kebelakangan ini memberi kesan besar terhadap pengeluaran hasil pertanian, terutamanya sayur-sayuran. Malaysia yang jelas mempunyai iklim tropika lembap, dengan hujan sepanjang tahun dan monsun menawarkan potensi yang baik untuk pertanian sayur-sayuran. Secara purata, Malaysia mendapat hujan tahunan sekitar 2,000 – 2,500 milimeter (mm) sehari atau lebih dan suhu yang hampir seragam sepanjang tahun[1]. Selain itu, cuaca di Malaysia juga turut dipengaruhi besar oleh dua monsun utama iaitu Monsun Timur Laut (November – Mac) yang membawa hujan lebat di sepanjang pantai timur Semenanjung Malaysia dan Monsun barat Daya (Mei – September) yang lebih kering bagi beberapa kawasan. Secara ringkas, keadaan cuaca yang lembap dan stabil serta wujud musim hujan dan tempoh yang agak kering, semua ini memberi implikasi signifikan kepada sektor pertanian sayur-sayuran di Malaysia.

Hujan lebat dan banjir merupakan antara faktor cuaca utama yang boleh memberi kesan serius terhadap pengeluaran sayur-sayuran di Malaysia. Walaupun air hujan diperlukan untuk pertumbuhan tanaman, jumlah yang berlebihan boleh membawa pelbagai implikasi negatif kepada kesihatan tanah, sistem akar dan hasil tanaman. Malaysia sering mengalami musim hujan yang tidak menentu terutamanya semasa Monsun Timur Laut. Hujan lebat yang berterusan boleh menyebabkan banjir kilat di kawasan rendah dan merosakkan tanaman akibat tanah yang terlalu lembap menyebabkan akar sayur mudah reput, manakala nutrien yang tidak dapat diserap oleh pokok akan larut dan hilang bersama air hujan[2]. Kesan dari situasi ini, harga sayuran akan melonjak naik sehingga 100 peratus susulan pengeluaran hasil sayuran yang terjejas teruk dan mengalami kekurangan bekalan[3].

Pada 2023, cuaca panas yang melanda negara sejak Mei berlanjutan sehingga Ogos ekoran perubahan kitaran musim kepada Monsun barat Daya[1]. Fenomena El Niño berlaku apabila suhu permukaan laut di kawasan Lautan Pasifik Khatulistiwa meningkat melebihi 0.5 darjah Celsius daripada purata jangka panjang[1]. Di Malaysia, kesan El Niño lazimnya membawa

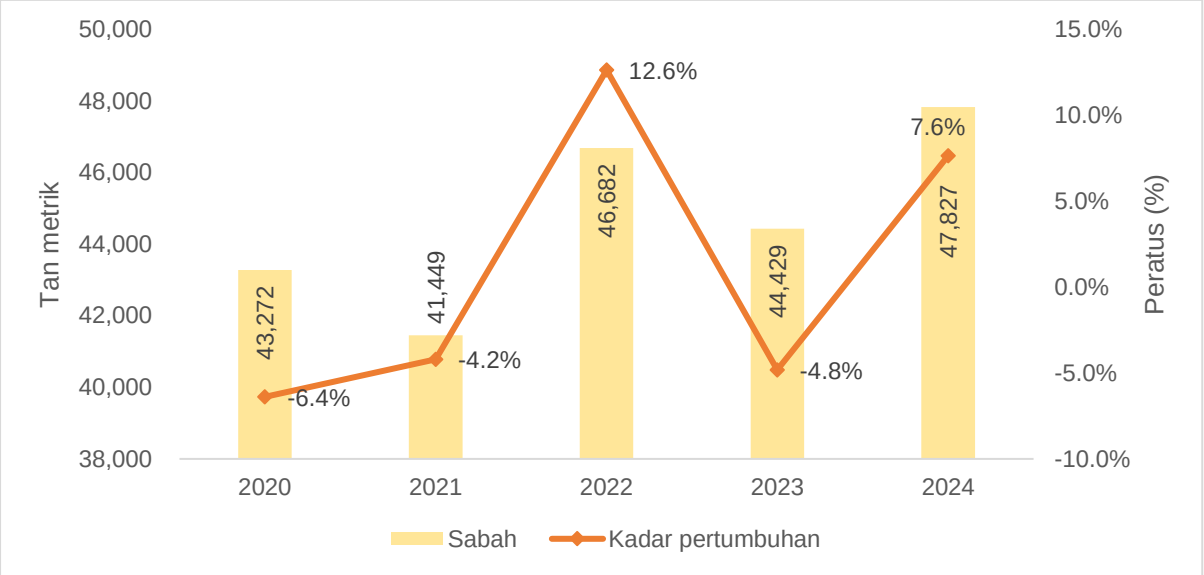
[1] Jabatan Meteorologi Malaysia
[2] https://agrimag.my/bm/article-details/kesan-pokok-apabila-hujan-berlebihan
[3] www.bharian.com.my/hujan-lebat-punca-harga-makanan-meningkat

kepada cuaca panas dan kering berpanjangan, pengurangan taburan hujan, serta penurunan kelembapan tanah yang boleh menjejaskan pertumbuhan tanaman seperti padi dan sayur-sayuran. Walaupun tidak semua jenis tanaman sayur-sayuran terjejas akibat cuaca panas, namun apabila suhu meningkat sehingga mencecah 40 darjah Celsius, keadaan tersebut tanpa ragu akan memberikan impak negatif terhadap aktiviti pertanian secara keseluruhan[4]. Cuaca panas yang melampau boleh menjejaskan pertumbuhan optimum tanaman, sekali gus menurunkan kualiti sayur-sayuran yang dihasilkan dan seterusnya mendorong kepada peningkatan harga di pasaran[5].

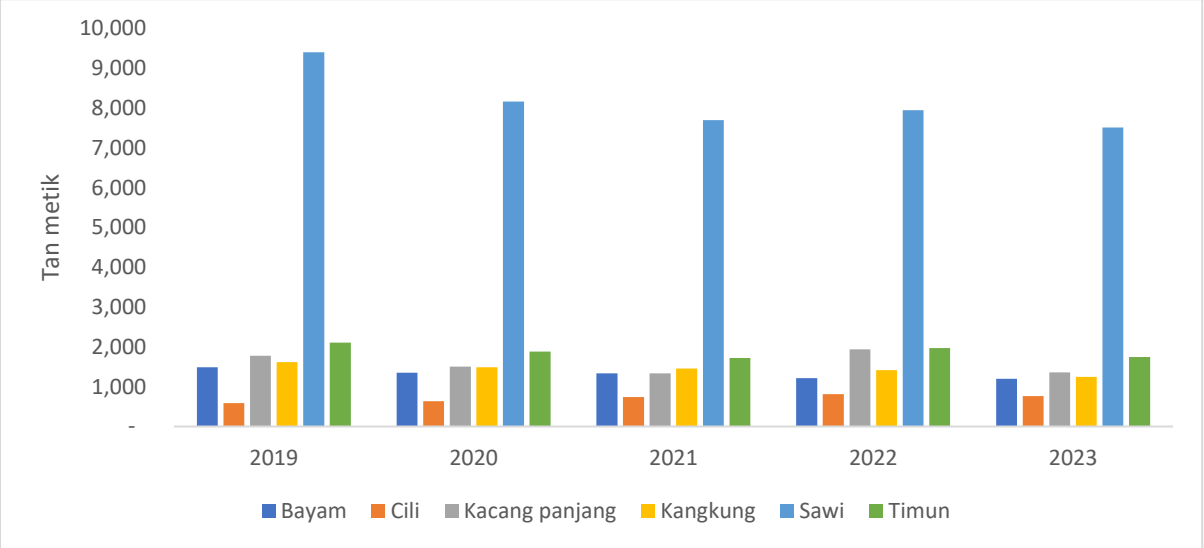
Jumlah taburan hujan di Sabah menurun antara tahun 2022 dan 2023. Pada tahun 2022, jumlah hujan yang direkodkan adalah sebanyak 2,870.3 mm, manakala pada tahun 2023 ia menurun kepada 2,539.7 mm[1]. Penurunan sebanyak 11.5 peratus ini menunjukkan keadaan cuaca yang kering di Sabah. Pengeluaran sayur-sayuran di Sabah juga terkesan dengan hujan yang berkurang pada 2023, pengeluaran sayur-sayuran di Sabah pada 2023 merekodkan sebanyak 44,429 tan metrik berbanding 46,682 tan metrik pada 2022[6] dengan penurunan sebanyak 4.8 peratus. Situasi ini agak bertentangan dengan dapatan Keluaran Dalam Negara Kasar (KDNK) pada harga malar 2015 sayur-sayuran yang mencatatkan sebanyak RM13,148 juta dengan kadar pertumbuhan yang sederhana iaitu 0.2 peratus. Namun, pada tahun 2023, KDNK pada harga malar 2015 sayur-sayuran meningkat kepada RM13,842 juta, disertai pertumbuhan yang lebih kukuh sebanyak 5.3 peratus[7].

[1] Jabatan Meteorologi Malaysia
[4] https://bda.nres.gov.my/index.php/ms/hidden-news/1012-cuaca-panas-hasil-tanaman-lebih-banyak-berkualiti
[5] https://www.mstar.com.my/lokal/semasa/2016/04/04/musim-panas-jejas-tanaman
[6] Jabatan Pertanian Malaysia
[7] Jabatan Perangkaan Malaysia

Carta 1: Pengeluaran dan kadar pertumbuhan sayur-sayuran di Sabah, 2020-2024




Carta 2: Pengeluaran tanaman sayur-sayuran utama di Sabah, 2019-2023




Sumber: Jabatan Pertanian Malaysia

Pengeluaran sayur-sayuran utama di Sabah pada 2023 secara keseluruhan menunjukkan penurunan berbanding tahun 2022, sejajar dengan pengurangan jumlah hujan. Semua jenis sayur menunjukkan penurunan dengan kacang panjang menurun paling tinggi sebanyak 29.8 peratus. Corak ini menunjukkan bahawa keadaan cuaca yang lebih kering pada 2023 telah memberi kesan negatif terhadap pengeluaran kebanyakan tanaman sayur-sayuran utama di Sabah.

Bagi mengekalkan pengeluaran sayur-sayuran yang stabil dalam keadaan cuaca yang semakin tidak menentu, pelbagai langkah perlu diambil oleh petani dan pihak berwajib. Antara tindakan utama ialah memperluas penggunaan teknologi pertanian moden seperti sistem fertigasi, rumah lindungan hujan dan irigasi titisan, yang dapat membantu mengawal kelembapan tanah dan mengurangkan risiko penyakit tanaman akibat hujan berlebihan. Selain itu, pelaksanaan amalan pertanian lestari (*Good Agricultural Practices, GAP*) serta pembangunan infrastruktur saliran dan pengurusan air yang efisien mampu meningkatkan ketahanan tanaman terhadap perubahan iklim. Kerajaan melalui Kementerian Pertanian dan Keterjaminan Makanan (KPKM) juga menyediakan bantuan teknikal, latihan, dan pembiayaan kepada petani bagi menggalakkan penggunaan teknologi hijau dan pengurusan ladang yang cekap. Langkah-langkah ini sejajar dengan aspirasi Dasar Agromakanan Negara 2.0 (DAN 2.0) yang menekankan adaptasi terhadap perubahan iklim dan kelestarian pengeluaran makanan negara[8].

Secara keseluruhannya, perubahan corak cuaca di Malaysia seperti peningkatan suhu, hujan lebat, dan kejadian cuaca ekstrem seperti El Niño dan La Niña memberikan kesan yang ketara terhadap pengeluaran sayur-sayuran negara. Keadaan cuaca yang tidak menentu boleh menjejaskan pertumbuhan tanaman, menyebabkan kerosakan fizikal, kehilangan nutrien tanah, serta meningkatkan risiko penyakit tanaman. Walaupun begitu, sektor pertanian Malaysia menunjukkan tahap daya tahan yang baik melalui penerapan teknologi moden seperti sistem fertigasi, rumah lindungan hujan, dan pengurusan saliran yang cekap. Justeru, adaptasi terhadap perubahan iklim amat penting bagi memastikan pengeluaran sayur-sayuran kekal stabil dan mampu memenuhi keperluan makanan negara secara berterusan.

**Penafian:**

Pandangan yang dinyatakan adalah pandangan penulis dan tidak mewakili pandangan DOSM.

[8] Kementerian Pertanian dan Keterjaminan Makanan (KPKM)

## *Implications of Weather on Vegetable Production in Sabah*

*Siti Nur Syafiqah Mohd Zulkiflee, Syed Ibrahim Mohd Jamaluddin, Latifah Mohamed Shah*

*Malaysia's agricultural sector is a key pillar in ensuring food supply stability and is one of the important components of the national economy, this sector operates in an equatorial climate that previously exhibited relatively consistent and predictable weather patterns. Although such conditions are generally favourable for agricultural activities, recent changes in weather patterns and increasing climatic variability have significantly impacted crop production, particularly vegetables. Malaysia's humid tropical climate, characterised by year-round rainfall and monsoon seasons, offers strong potential for vegetable cultivation. On average, Malaysia receives about 2,000–2,500 millimetres (mm) of rainfall annually, accompanied by fairly uniform temperatures throughout the year[1]. In addition, the country's weather is significantly influenced by two major monsoon seasons which is the Northeast Monsoon (November–March), which brings heavy rainfall to the east coast of Peninsular Malaysia and the Southwest Monsoon (May–September), which is relatively drier in certain areas. In summary, the combination of humid and stable weather conditions along with distinct wet and moderately dry seasons creates significant implications for Malaysia's vegetable agriculture sector.*

*Heavy rainfall and flooding are among the main weather factors that can adversely affect vegetable production in Malaysia. While rainwater is essential for plant growth, excessive rainfall can bring various negative impacts on soil health, root systems and crop yields. Malaysia often experiences unpredictable wet seasons, particularly during the Northeast Monsoon. Prolonged heavy rainfall can trigger flash floods in low-lying areas and damage crops due to overly saturated soils that cause root rot, meanwhile essential nutrients are washed away and unable to be absorbed by plants[2]. As a result, vegetable prices can surge by up to 100 percent due to severely disrupted production and reduced supply[3].*

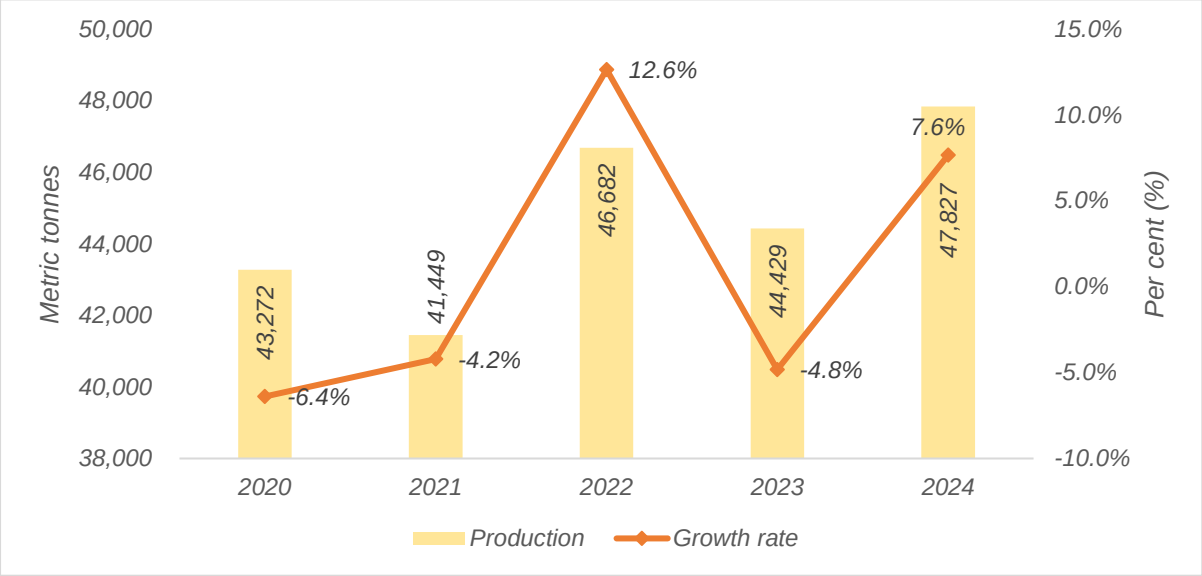
*In 2023, Malaysia experienced prolonged hot weather from May to August due to the shift to the Southwest Monsoon[1]. The El Niño phenomenon occurs when sea surface temperatures in the equatorial Pacific Ocean rise by more than 0.5 degrees Celsius above the long-term average[1]. In Malaysia, El Niño typically brings prolonged hot and dry conditions, reduced rainfall and decreased soil moisture which can adversely affect crop growth, including rice and vegetables. Although not all vegetable crops are affected by hot weather, temperatures rising up to 40 degrees Celsius undoubtedly impose negative impacts on agricultural activities as a*

[1] *Malaysian Meteorological Department*
[2] *https://agrimag.my/bm/article-details/kesan-pokok-apabila-hujan-berlebihan*
[3] *www.bharian.com.my/hujan-lebat-punca-harga-makanan-meningkat*

*whole[4]. Extreme heat can hinder optimal plant growth, reduce the quality of harvested vegetables and consequently contribute to rising market prices[5].*

*The amount of rainfall in Sabah decreased between 2022 and 2023. In 2022, total recorded rainfall was 2,870.3 mm, whereas in 2023 it decreased to 2,539.7 mm[1]. The decrease of 11.5 per cent reflects a drier climate in Sabah. The production of vegetables in Sabah was quite affected by the decrease amount of rainfall received in 2023, Sabah recorded 44,429 metric tonnes of vegetable production in 2023 as compared to 46,682 metric tonnes in 2022[6], marking a decrease of 4.8 per cent. This situation is quite the opposite with the Gross Domestic Product (GDP) at constant 2015 prices for the vegetable subsector, which amounted to RM13,148 million with a modest growth rate of 0.2 per cent in 2022. In 2023, however, vegetable GDP at constant 2015 increased to RM13,842 million, accompanied by a stronger growth of 5.3 per cent[7].*

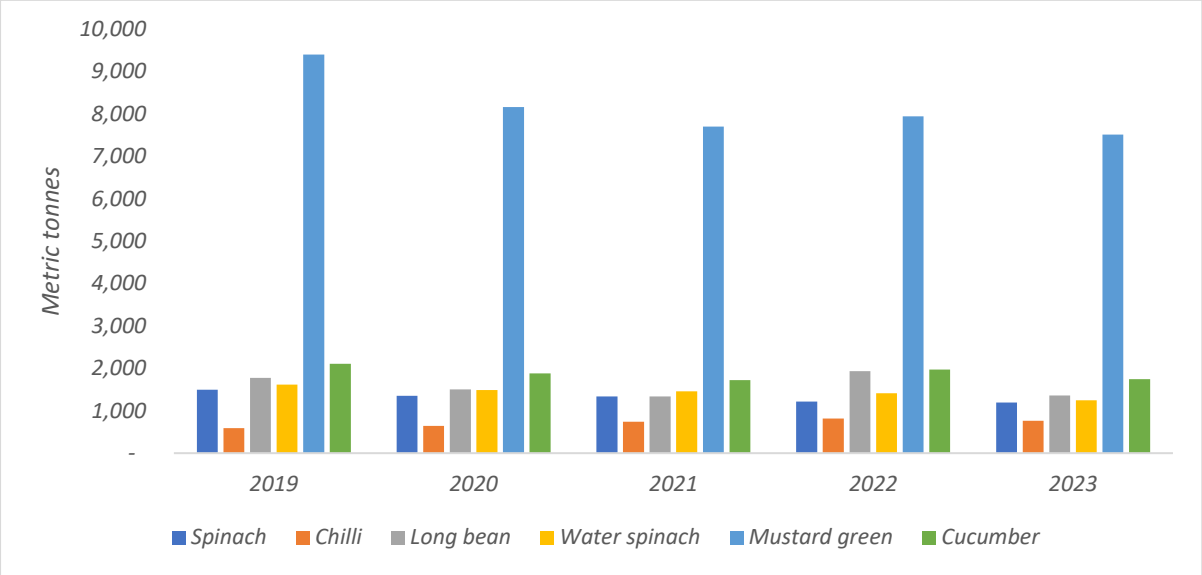
*Chart 3: Vegetable production and growth rate in Sabah, 2020–2024*




*Source: Department of Agriculture Malaysia*

[1] *Malaysian Meteorological Department*
[4] *https://bda.nres.gov.my/index.php/ms/hidden-news/1012-cuaca-panas-hasil-tanaman-lebih-banyak-berkualiti*
[5] *https://www.mstar.com.my/lokal/semasa/2016/04/04/musim-panas-jejas-tanaman*
[6] *Department of Agriculture Malaysia*
[7] *Department of Statistics Malaysia*

*Chart 4: Main vegetables production in Sabah, 2019–2023*




*Source: Department of Agriculture Malaysia*

*Overall, main vegetable production in Sabah in 2023 showed a decrease as compared to 2022, in line with the reduction in rainfall. All types of vegetables recorded a decline, with long bean showing the largest decrease at 29.8 per cent. This pattern indicates that the drier weather conditions in 2023 had a negative impact on the production of most major vegetable crops in Sabah.*

*To maintain stable vegetable production amid increasingly unpredictable weather, various measures must be implemented by farmers and relevant authorities. Key actions include expanding the use of modern agricultural technologies such as fertigation systems, rain shelters and drip irrigation, which can help regulate soil moisture and reduce the risk of crop diseases caused by excessive rainfall. Additionally, implementing sustainable agricultural practices (Good Agricultural Practices, GAP) and improving water management and drainage infrastructure can enhance crop resilience to climate variability. The government, through the Ministry of Agriculture and Food Security (KPKM) will continue providing technical assistance, training and financial support to farmers to promote the adoption of green technologies and efficient farm management. These measures align with the aspirations of the National Agrofood Policy 2.0 (NAP 2.0), which emphasises climate adaptation and the sustainability of national food production[8].*

*In conclusion, changes in Malaysia's weather patterns such as rising temperatures, heavy rainfall and extreme weather events like El Niño and La Niña pose significant impacts on*

[8] *Ministry of Agriculture and Food Security (KPKM)*

*vegetable production nationwide. Unpredictable weather can hinder plant growth, cause physical damage, reduce soil nutrient availability and increase crop disease risks. Nevertheless, Malaysia's agricultural sector has demonstrated strong resilience through the adoption of modern technologies such as fertigation systems, rain shelters and efficient drainage management. Therefore, climate adaptation is crucial to ensuring stable vegetable production and sustaining the nation's food supply.*

***Disclaimer:***

*The views expressed are those of the author and do not represent the views of DOSM.*

# JADUAL STATISTIK

## *STATISTICAL TABLES*

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**Jadual 1.1: Purata suhu, jumlah hujan dan purata kelembapan relatif, Sabah, 2020-2024**

*Table 1.1: Mean temperature, total rainfall and mean relative humidity, Sabah, 2020-2024*

| Stesen meteorologi (ketinggian dari purata paras laut dalam meter)<br>*Meteorological station (height above mean sea level in metres)* | Tahun<br>Year | Purata suhu (°C)<br>*Mean temperature* | | Hujan<br>*Rainfall* | | Purata kelembapan relatif<br>*Mean relative humidity* (%) |
|---|---|---|---|---|---|---|
| | | Min. | Maks.<br>*Max.* | Jumlah<br>*Total (mm)* | Bil. Hari<br>*No. of days* | |
| Keningau | 2020 | 22.6 | 32.0 | 1,691.8 | 189 | 81.7 |
| (319.0 m) | 2021 | 22.1 | 31.6 | 1,589.2 | 192 | 82.3 |
| | 2022 | 22.3 | 31.3 | 2,433.1 | 234 | 83.3 |
| | 2023 | 22.4 | 32.2 | 1,429.2 | 184 | 81.6 |
| | **2024** | **22.2** | **31.2** | **1,708.6** | **194** | **81.2** |
| Kota Kinabalu | 2020 | 24.3 | 32.2 | 3,456.6 | 208 | 82.4 |
| (2.1 m) | 2021 | 24.1 | 31.8 | 3,584.8 | 201 | 82.7 |
| | 2022 | 23.9 | 31.8 | 3,566.6 | 208 | 83.0 |
| | 2023 | 24.5 | 32.6 | 2,161.9 | 175 | 80.5 |
| | **2024** | **24.8** | **32.7** | **3,046.9** | **175** | **81.1** |
| Kudat | 2020 | 24.6 | 31.0 | 2,238.4 | 165 | 82.9 |
| (3.5 m) | 2021 | 24.3 | 30.7 | 2,802.8 | 201 | 84.5 |
| | 2022 | 24.4 | 30.6 | 2,383.4 | 185 | 84.7 |
| | 2023 | 24.1 | 30.6 | 3,198.8 | 191 | 84.0 |
| | **2024** | **24.2** | **30.2** | **2,159.7** | **167** | **82.5** |
| Ranau | 2020 | 20.9 | 30.1 | 2,521.4 | 227 | 82.3 |
| (501.0 m) | 2021 | 20.7 | 30.0 | 2,926.0 | 242 | 82.7 |
| | 2022 | 21.0 | 30.0 | 3,116.0 | 239 | 83.1 |
| | 2023 | 21.0 | 30.3 | 2,902.2 | 223 | 83.6 |
| | **2024** | **21.7** | **30.7** | **2,162.0** | **211** | **81.8** |
| Sandakan | 2020 | 24.9 | 31.4 | 2,380.3 | 168 | 82.3 |
| (12.1 m) | 2021 | 24.6 | 31.2 | 3,394.0 | 212 | 83.7 |
| | 2022 | 24.5 | 31.2 | 3,419.6 | 217 | 84.0 |
| | 2023 | 24.9 | 31.8 | 3,697.9 | 207 | 82.2 |
| | **2024** | **25.4** | **32.0** | **2,538.0** | **167** | **81.9** |
| Tawau | 2020 | 23.8 | 31.8 | 1,947.8 | 185 | 85.0 |
| (17.5 m) | 2021 | 23.6 | 31.5 | 1,974.4 | 192 | 86.0 |
| | 2022 | 23.6 | 31.4 | 2,303.0 | 189 | 84.9 |
| | 2023 | 24.1 | 32.2 | 1,847.9 | 179 | 83.7 |
| | **2024** | **24.4** | **32.1** | **2,201.4** | **180** | **83.9** |

**Sumber: Jabatan Meteorologi Malaysia**
*Source: Malaysia Meteorological Department*

**Jadual 1.2: Purata tekanan aras laut, kelajuan angin permukaan, sinaran global, penyejatan dan bilangan hari kilat, Sabah, 2020-2024**

*Table 1.2: Mean sea level pressure, surface wind speed, global radiation, evaporation and number of days with lightning, Sabah, 2020-2024*

| Stesen meteorologi (ketinggian dari purata paras laut dalam meter)<br>*Meteorological station (height above mean sea level in metres)* | Tahun<br>*Year* | Purata tekanan aras laut<br>*Sea level pressure (hPa)* | Purata kelajuan angin permukaan<br>*Mean surface wind speed (m/s)* | Purata sinaran global<br>*Mean global radiation (MJ/m3)* | Purata penyejatan<br>*Mean evaporation (mm)* | Bil. hari kilat<br>*No. of days with lightning* |
|---|---|---|---|---|---|---|
| Keningau | 2020 | 1,010.7 | 1.0 | 19.63 | n.a. | n.a. |
| (319.0 m) | 2021 | 1,010.6 | 0.9 | 19.70 | n.a. | n.a. |
| | 2022 | 1,010.2 | 0.9 | 19.14 | n.a. | n.a. |
| | 2023 | 1,011.1 | 1.0 | Def. | n.a. | n.a. |
| | **2024** | **1,010.7** | **1.0** | **Def.** | **n.a.** | **1** |
| Kota Kinabalu | 2020 | 1,009.5 | 2.2 | 20.06 | 4.80 | 189 |
| (2.1 m) | 2021 | 1,009.4 | 2.1 | 19.10 | 4.50 | 184 |
| | 2022 | 1,009.2 | 2.0 | 18.89 | 4.26 | 212 |
| | 2023 | 1,009.8 | Def. | Def. | 4.04 | 176 |
| | **2024** | **1,009.5** | **2.0** | **19.40** | **Def.** | **157** |
| Kudat | 2020 | 1,009.8 | 2.4 | n.a. | 4.70 | 66 |
| (3.5 m) | 2021 | 1,009.5 | 2.3 | n.a. | 4.30 | 57 |
| | 2022 | 1,009.1 | 2.0 | n.a. | 4.17 | 90 |
| | 2023 | 1,010.2 | 2.2 | Def. | Def. | 36 |
| | **2024** | **1,009.9** | **2.4** | **20.29** | **4.41** | **n.a.** |
| Ranau | 2020 | 1,011.1 | 1.2 | 17.82 | n.a. | n.a. |
| (501.0 m) | 2021 | 1,011.0 | 1.2 | 18.80 | n.a. | 92 |
| | 2022 | 1,010.6 | 1.1 | 18.99 | n.a. | 89 |
| | 2023 | 1,011.6 | 1.1 | Def. | n.a. | 73 |
| | **2024** | **1,011.2** | **1.2** | **19.10** | **n.a.** | **62** |
| Sandakan | 2020 | 1,009.7 | 2.1 | 19.63 | 4.90 | 149 |
| (12.1 m) | 2021 | 1,009.3 | 2.1 | 18.60 | 4.80 | 163 |
| | 2022 | 1,008.9 | 2.0 | 18.63 | 4.38 | 176 |
| | 2023 | 1,009.9 | 2.2 | Def. | Def. | 153 |
| | **2024** | **1,009.8** | **2.4** | **19.18** | **Def.** | **132** |
| Tawau | 2020 | 1,009.6 | 1.6 | 17.91 | 4.10 | 120 |
| (17.5 m) | 2021 | 1,009.3 | 1.4 | 17.30 | 4.00 | 184 |
| | 2022 | 1,009.1 | 1.3 | 17.09 | 3.72 | 178 |
| | 2023 | 1,010.0 | 1.5 | Def. | Def. | 170 |
| | **2024** | **1,009.9** | **1.5** | **18.10** | **Def.** | **119** |

**Sumber: Jabatan Meteorologi Malaysia**
*Source: Malaysia Meteorological Department*

**Nota: *April - Disember 2022, tiada bacaan direkodkan sepanjang Januari - Mac 2022**
*Notes: April - December 2022, no readings were recorded between January - March 2022*

**Jadual 1.3: Purata bulanan tekanan aras laut, Sabah, 2024**

*Table 1.4: Monthly mean sea level pressure, Sabah, 2024*

m/s

| Stesen *Station* | Jan. | Feb. | Mac *Mar.* | Apr. | Mei *May* | Jun *June* | Julai *July* | Ogos *Aug.* | Sept. | Okt. *Oct.* | Nov. | Dis. *Dec.* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kota Kinabalu | 1,010.7 | 1,011.2 | 1,010.2 | 1,008.4 | 1,008.5 | 1,009.9 | 1,009.3 | 1,010.0 | 1,008.8 | 1,009.7 | 1,008.8 | 1,008.4 |
| Kudat | 1,011.6 | 1,012.9 | 1,011.6 | 1,009.3 | 1,008.8 | 1,010.0 | 1,009.2 | 1,009.9 | 1,008.6 | 1,009.3 | 1,009.1 | 1,008.6 |
| Sandakan | 1,011.4 | 1,012.7 | 1,011.5 | 1,009.3 | 1,008.8 | 1,009.9 | 1,009.1 | 1,009.8 | 1,008.5 | 1,009.0 | 1,008.9 | 1,008.3 |
| Tawau | 1,010.9 | 1,012.1 | 1,011.1 | 1,009.5 | 1,009.1 | 1,010.4 | 1,009.7 | 1,010.2 | 1,009.2 | 1,009.4 | 1,008.8 | 1,008.1 |
| Keningau | 1,012.2 | 1,012.9 | 1,011.6 | 1,009.5 | 1,009.6 | 1,011.1 | 1,010.3 | 1,010.9 | 1,010.0 | 1,010.6 | 1,009.8 | 1,009.4 |
| Ranau | 1,013.1 | 1,014.1 | 1,012.7 | 1,010.5 | 1,010.1 | 1,011.5 | 1,010.6 | 1,011.2 | 1,009.9 | 1,010.5 | 1,010.5 | 1,009.8 |

**Jadual 1.4: Purata bulanan kelajuan angin permukaan, Sabah, 2024**

*Table 1.4: Monthly mean surface wind speed, Sabah, 2024*

m/s

| Stesen *Station* | Jan. | Feb. | Mac *Mar.* | Apr. | Mei *May* | Jun *June* | Julai *July* | Ogos *Aug.* | Sept. | Okt. *Oct.* | Nov. | Dis. *Dec.* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kota Kinabalu | 1.8 | 1.8 | 1.9 | 1.9 | 2.0 | 2.0 | 1.9 | 2.2 | 2.2 | 2.3 | 1.9 | 1.9 |
| Kudat | 3.0 | 3.2 | 2.8 | 2.6 | 2.2 | 1.9 | 2.1 | 2.2 | 2.6 | 2.6 | 1.8 | 1.9 |
| Sandakan | 3.6 | 3.7 | 2.9 | 2.4 | 2.3 | 1.9 | 1.9 | 1.9 | 2.1 | 2.2 | 2.1 | 2.4 |
| Tawau | 1.5 | 1.7 | 1.7 | 1.5 | 1.6 | 1.3 | 1.4 | 1.5 | 1.8 | 1.6 | 1.3 | 1.2 |
| Keningau | 0.9 | 1.2 | 1.3 | 1.2 | 0.9 | 0.9 | 0.9 | 1.0 | 1.0 | 1.1 | 1.0 | 1.0 |
| Ranau | 1.3 | 1.3 | 1.3 | 1.2 | 1.0 | 0.9 | 1.2 | 1.1 | 1.6 | 1.5 | 1.0 | 0.9 |

**Jadual 1.5: Purata bulanan sinaran global, Sabah, 2024**

*Table 1.5: Monthly mean global radiation, Sabah, 2024*

$MJ/m^2$

| Stesen *Station* | Jan. | Feb. | Mac *Mar.* | Apr. | Mei *May* | Jun *June* | Julai *July* | Ogos *Aug.* | Sept. | Okt. *Oct.* | Nov. | Dis. *Dec.* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kota Kinabalu | 20.02 | 21.70 | 23.48 | 22.22 | 19.53 | 17.38 | 18.07 | 19.20 | 16.96 | 17.75 | 19.24 | 17.28 |
| Kudat | 18.47 | 22.15 | 24.60 | 25.60 | 23.78 | 18.50 | 19.52 | 19.37 | 19.86 | 19.34 | 17.57 | 14.74 |
| Sandakan | 16.88 | 19.82 | 21.40 | 24.32 | 23.12 | 16.40 | 18.06 | 19.50 | 19.82 | 19.93 | 16.54 | 14.34 |
| Tawau | 15.49 | 18.37 | 18.96 | 18.97 | 20.01 | 16.09 | 16.63 | 18.60 | 19.86 | 20.43 | 18.04 | 15.76 |
| Keningau | 17.62 | 22.84 | 22.83 | 24.48 | 23.18 | 20.07 | 21.81 | 22.90 | 21.70 | 22.73 | 11.34 | Def. |
| Ranau | 16.84 | 19.41 | 21.67 | 22.03 | 20.52 | 17.78 | 18.79 | 19.50 | 18.98 | 19.33 | 18.36 | 15.97 |

**Jadual 1.6: Purata bulanan penyejatan, Sabah, 2024**

*Table 1.6: Monthly mean evaporation, Sabah, 2024*

mm

| Stesen *Station* | Jan. | Feb. | Mac *Mar.* | Apr. | Mei *May* | Jun *June* | Julai *July* | Ogos *Aug.* | Sept. | Okt. *Oct.* | Nov. | Dis. *Dec.* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kota Kinabalu | 4.0 | 4.4 | n.a. | n.a. | 4.2 | 4.1 | Def. | 4.4 | 4.2 | 3.6 | 4.3 | 4.2 |
| Kudat | 4.4 | 5.1 | n.a. | n.a. | 6.0 | 4.0 | 4.6 | 4.4 | 4.6 | 3.6 | 4.1 | 3.2 |
| Sandakan | 5.3 | Def. | n.a. | n.a. | 6.9 | 4.4 | 4.5 | 4.7 | 4.8 | 4.4 | 4.2 | 3.4 |
| Tawau | 3.8 | 4.2 | n.a. | n.a. | 4.2 | 3.0 | Def. | 3.9 | 4.7 | 4.5 | 4.0 | 4.0 |

**Sumber: Jabatan Meteorologi Malaysia**
*Source: Malaysia Meteorological Department*

**Jadual 1.7: Bacaan maksimum harian Indeks Ultra Ungu (UV), Kota Kinabalu, 2024**

*Table 1.7: Daily maximum reading of the Ultra Violet (UV) Index, Kota Kinabalu, 2024*

| Stesen/*Station* | Kota Kinabalu | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan/*Monthly* Hari/*Days* | Jan. | Feb. | Mac *Mar.* | Apr. | Mei *May* | Jun *June* | Julai *July* | Ogos *Aug.* | Sept. | Okt. *Oct.* | Nov. | Dis. *Dec.* |
| 1 | n.a. | n.a. | 11+ | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 11+ | 11+ |
| 2 | n.a. | n.a. | 11+ | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 11+ | 11+ |
| 3 | n.a. | 10 | 11+ | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 11+ | 11+ |
| 4 | n.a. | 11+ | 11+ | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 11+ | 10 |
| 5 | n.a. | 11+ | 11+ | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 11+ | 8 |
| 6 | n.a. | 11+ | 11+ | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 11+ | 11+ |
| 7 | n.a. | 11+ | 11+ | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 11+ | 11+ |
| 8 | n.a. | 11+ | 11+ | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 11+ | 4 |
| 9 | n.a. | 11+ | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 11+ | 11+ |
| 10 | n.a. | 11+ | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 11+ | 11+ |
| 11 | n.a. | 11+ | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 11+ | 11+ | 11+ |
| 12 | n.a. | 11+ | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 11+ | 11+ | 11+ |
| 13 | n.a. | 11+ | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 11+ | 11+ | 11+ |
| 14 | n.a. | 11+ | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 11+ | 11+ | 7 |
| 15 | n.a. | 11+ | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 11+ | 11+ | n.a. |
| 16 | n.a. | 11+ | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 11+ | 11+ | 10 |
| 17 | n.a. | 11+ | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 6 | 11+ | 11+ |
| 18 | n.a. | 11+ | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 11+ | 11+ | 11+ |
| 19 | n.a. | 11+ | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 8 | 11+ | 11+ |
| 20 | n.a. | 11+ | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 11+ | 11+ | 10 |
| 21 | n.a. | 11+ | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 7 | 11+ | 10 |
| 22 | n.a. | 11+ | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 9 | 11+ | 4 |
| 23 | n.a. | 11+ | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 11+ | 11+ | 11+ |
| 24 | n.a. | 11+ | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 11+ | 10 | 10 |
| 25 | n.a. | 11+ | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 11+ | 11+ | 11+ |
| 26 | n.a. | 11+ | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 8 | 5 | 7 |
| 27 | n.a. | 11+ | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 11+ | 11+ | 11+ |
| 28 | n.a. | 11+ | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 11+ | 9 | 11 |
| 29 | n.a. | 11+ | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 11+ | 10 | 11+ |
| 30 | n.a. | | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 11+ | 11+ | 11+ |
| 31 | n.a. | | n.a. | | n.a. | | n.a. | n.a. | | 11+ | | 11+ |

**Nota:** **Def.** **Nilai defektif/**
*Notes:* Defective value

**Sumber: Jabatan Meteorologi Malaysia**
*Source:* *Malaysia Meteorological Department*

**n.a.** **Tiada pencerapan data disebabkan masalah instrumentasi**
No data observation due to instrumentation problems

**Status Indeks Ultra Ungu (UV)**
*Ultra Violet Index (UV) status*

| | |
|---|---|
| 0 to 2 | Rendah / *Low* |
| 3 to 5 | Sederhana / *Moderate* |
| 6 to 7 | Tinggi / *High* |
| 8 to 10 | Sangat Tinggi / *Very High* |
| 11 + | Melampau / *Extreme* |

**Jadual 1.8: Senarai lembangan sungai utama di Sabah**

*Table 1.8: List of major river basins in Sabah*

| Bil. *No.* | Nama lembangan sungai *River basins name* | Luas ($km^2$) *Area* | Kategori *Category* | Negeri/ Negara *State/ Country* |
|---|---|---|---|---|
| 1 | Trusan Kinabatangan | 16,072.95 | 1 | Sabah |
| 2 | Sg. Padas | 8,822.16 | 1 | Sabah |
| 3 | Sg. Labuk | 5,667.59 | 1 | Sabah |
| 4 | Sg. Segama | 4,402.69 | 1 | Sabah |
| 5 | Sg. Sugut | 3,066.72 | 1 | Sabah |
| 6 | Sg. Kalabakan | 1,337.44 | 1 | Sabah |
| 7 | Sg. Kalumpang | 1,112.01 | 1 | Sabah |
| 8 | Sg. Tuaran | 988.42 | 1 | Sabah |
| 9 | Sg. Abai | 861.88 | 1 | Sabah |
| 10 | Sg. Kretam Besar | 844.74 | 1 | Sabah |
| 11 | Sg. Maruap | 839.31 | 1 | Sabah |
| 12 | Sg. Tuingkayu | 789.78 | 1 | Sabah |
| 13 | Sg. Papar | 788.03 | 1 | Sabah |
| 14 | Sg. Tandek | 703.92 | 1 | Sabah |
| 15 | Sg. Serudong | 698.93 | 1 | Sabah |
| 16 | Sg. Paitan | 670.48 | 1 | Sabah |
| 17 | Sg. Brantian | 599.06 | 1 | Sabah |
| 18 | Sg. Mengalong | 587.85 | 1 | Sabah |
| 19 | Sg. Silabukan | 525.72 | 1 | Sabah |
| 20 | Sg. Bongon | 499.50 | 1 | Sabah |
| 21 | Sg. Klias | 479.79 | 1 | Sabah |
| 22 | Sg. Bongaya | 444.79 | 1 | Sabah |
| 23 | Sg. Umas Umas | 415.37 | 1 | Sabah |
| 24 | Sg. Kaindangan | 375.11 | 1 | Sabah |
| 25 | Sg. Tiram | 352.46 | 1 | Sabah |
| 26 | Sg. Bukau | 349.72 | 1 | Sabah |
| 27 | Sg. Sinsilog | 305.16 | 1 | Sabah |
| 28 | Sg. Membakut | 292.24 | 1 | Sabah |
| 29 | Sg. Sengarong | 278.13 | 1 | Sabah |
| 30 | Sg. Burong | 275.99 | 1 | Sabah |
| 31 | Sg. Monyog | 274.26 | 1 | Sabah |
| 32 | Sg. Samawang | 260.47 | 1 | Sabah |
| 33 | Sg. Bandau | 253.21 | 1 | Sabah |
| 34 | Sg. Ulu Tungku | 250.39 | 1 | Sabah |
| 35 | Sg. Segaliud | 248.94 | 1 | Sabah |
| 36 | Sg. Kanibongan | 227.78 | 1 | Sabah |

**Jadual 1.8: Senarai lembangan sungai utama di Sabah (samb.)**

*Table 1.8: List of major river basins in Sabah (cont'd)*

| Bil. *No.* | Nama lembangan sungai *River basins name* | Luas ($km^2$) *Area* | Kategori *Category* | Negeri/ Negara *State/ Country* |
|---|---|---|---|---|
| 37 | Sg. Keguraan | 226.12 | 1 | Sabah |
| 38 | Sg. Sahabat | 225.12 | 1 | Sabah |
| 39 | Sg. K.Klagan | 208.46 | 1 | Sabah |
| 40 | Sg. Bongawan | 206.81 | 1 | Sabah |
| 41 | Sg. Lakutan | 204.39 | 1 | Sabah |
| 42 | Sg. Langkon | 202.94 | 1 | Sabah |
| 43 | Sg. Mumiang | 198.31 | 1 | Sabah |
| 44 | Sg. Kimanis | 190.43 | 1 | Sabah |
| 45 | Sg. Gum-Gum Besar | 163.74 | 1 | Sabah |
| 46 | Sg. Binsuluk | 160.88 | 1 | Sabah |
| 47 | Sg. Telaga | 155.78 | 1 | Sabah |
| 48 | Sg. Mamahat | 152.16 | 1 | Sabah |
| 49 | Sg. Sapagaya | 127.99 | 1 | Sabah |
| 50 | Sg. Merotai | 149.60 | 1 | Sabah |
| 51 | Sg. Jeragan Bistari | 148.09 | 1 | Sabah |
| 52 | Sg. Tawau | 142.19 | 1 | Sabah |
| 53 | Sg. Pegagau | 141.54 | 1 | Sabah |
| 54 | Sg. Sepagaya | 127.99 | 1 | Sabah |
| 55 | Sg. Sulaman | 127.60 | 1 | Sabah |
| 56 | Sg. Kolapis | 121.26 | 1 | Sabah |
| 57 | Sg. Sabahan | 120.95 | 1 | Sabah |
| 58 | Sg. Tanjung Labian | 116.80 | 1 | Sabah |
| 59 | Sg. Apas | 116.04 | 1 | Sabah |
| 60 | Sg. Mengkabong | 114.66 | 1 | Sabah |
| 61 | Sg. Milau | 114.38 | 1 | Sabah |
| 62 | Sg. Tempasuk | 110.15 | 1 | Sabah |
| 63 | Sg. Sekong Besar | 108.15 | 1 | Sabah |
| 64 | Sg. Betotan | 107.99 | 1 | Sabah |
| 65 | Sg. Suanlamba Besar | 100.86 | 1 | Sabah |
| 66 | Sg. Inanam | 95.90 | 1 | Sabah |
| 67 | Sg. Simandalan | 93.50 | 1 | Sabah |
| 68 | Sg. Tatulit | 90.64 | 1 | Sabah |
| 69 | Sg. Bode Besar | 89.86 | 1 | Sabah |
| 70 | Sg. Pimpin | 85.73 | 1 | Sabah |
| 71 | Sg. Sibunga Besar | 81.89 | 1 | Sabah |
| 72 | Sg. Manalunan | 81.37 | 1 | Sabah |

**Jadual 1.8: Senarai lembangan sungai utama di Sabah (samb.)**

*Table 1.8: List of major river basins in Sabah (cont'd)*

| Bil. *No.* | Nama lembangan sungai *River basins name* | Luas ($km^2$) *Area* | Kategori *Category* | Negeri/ Negara *State/ Country* |
|---|---|---|---|---|
| 73 | Sg. Tegupi | 81.35 | 1 | Sabah |
| 74 | Sg. Sibuku | 799.45 | 3 | Sabah/ Indonesia |
| 75 | Sg. Sembakung | 5,467.77 | 3 | Sabah/ Indonesia |

**Nota: Kajian Persempadanan Lembangan Sungai Malaysia Fasa I oleh Bahagian Pengurusan Lembangan Sungai (2009)**
*Notes: Malaysia River Basin Boundary Study Phase I by the River Basin Management Division (2009)*

**Kategori 1: Lembangan sungai dalam 1 negeri**
*Category 1: River basin within the state*

**Kategori 2: Lembangan sungai melibatkan lebih dari 1 negeri**
*Category 2: River basin shared with more than 1 state*

**Lembangan sungai utama: Lembangan yang berkeluasan melebihi 80 km²**
*Main river basins: An area of over 80 km²*

**Jadual 1.9: Panjang pesisiran pantai, Sabah**

*Table 1.9: Coastal length, Sabah*

| Negeri *State* | Panjang pantai (km) *Coastal length* | Peratus *Per cent* |
|---|---|---|
| **Malaysia** | **8,840.0** | **100.0** |
| Sabah | 3,752.9 | 42.5 |

**Nota***l Notes:* ***National Coastal Erosion Study for Malaysia (2015)***

**Jadual 1.10: Empangan dan kolam takungan di Sabah**

*Table 1.10: Dams and reservoirs in Sabah*

| Bil. *No.* | Nama empangan (Tahun siap dibina) *Name of dam (Year of completion)* | Lokasi (Negeri) *Location (State)* | Empangan *Dams* | | | | Kolam takungan *Reservoirs* | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Tinggi *Height (m)* | Panjang puncak *Peak length (m)* | Aras puncak *Top peak (m)* | Kawasan tadahan *Catchment area (km²)* | Kapasiti *Capacity (Mm³)* | Luahan alur limpah maksimum *Maximum flood flow* (cumecs) | Luas permukaan *Surface area (km²)* | Aras biasa *Ordinary level (m)* |
| 1 | Tenom (1984) | Sabah | - | - | - | 7,815.00 | 4.70 | 690.00 | - | 173.90 |
| 2 | Babagon (1997) | Sabah | 73.00 | 375.00 | 133.10 | 30.00 | 16.60 | 2,136.00 | 0.75 | 122.00 |
| 3 | Pinangsoo (1969) | Sabah | 12.00 | 65.00 | 18.30 | 3.37 | 0.49 | 84.00 | 0.50 | 16.24 |
| 4 | Sepagaya (1984) | Sabah | 22.86 | 73.15 | 82.30 | 25.90 | 2.05 | 70.00 | 0.28 | 80.00 |
| 5 | Timbangan (1984) | Sabah | 15.24 | 156.00 | 57.60 | 21.70 | 0.81 | 162.00 | 0.22 | 55.50 |

**Sumber: Jabatan Pengairan dan Saliran**
*Source: Department of Irrigation and Drainage*

**Jadual 1.11: Keluasan tanah mengikut daerah, Sabah, 2025**

*Table 1.11: Land area by districts, Sabah, 2025*

| Bil.<br>*No.* | Negeri/ Daerah<br>*State/ District* | Keluasan ($km^2$)<br>*Area* |
|---|---|---|
| | **MALAYSIA** | **331,579.95** |
| | **Sabah** | **74,106.25** |
| 1 | Tawau | 2,249.54 |
| 2 | Lahad Datu | 7,480.29 |
| 3 | Semporna | 1,116.63 |
| 4 | Sandakan | 2,267.75 |
| 5 | Kinabatangan | 6,580.14 |
| 6 | Labuk dan Sugut (Beluran) | 2,008.18 |
| 7 | Kota Kinabalu | 368.35 |
| 8 | Ranau | 3,650.89 |
| 9 | Kota Belud | 1,388.47 |
| 10 | Tuaran | 1,148.01 |
| 11 | Penampang | 442.01 |
| 12 | Papar | 611.03 |
| 13 | Kudat | 1,299.13 |
| 14 | Kota Marudu | 1,767.97 |
| 15 | Pitas | 1,507.44 |
| 16 | Beaufort | 1,440.36 |
| 17 | Kuala Penyu | 445.85 |
| 18 | Sipitang | 2,738.63 |
| 19 | Tenom | 2,406.89 |
| 20 | Pensiangan/ Nabawan | 5,973.77 |
| 21 | Keningau | 810.82 |
| 22 | Tambunan | 1,341.59 |
| 23 | Kunak | 1,113.81 |
| 24 | Tongod | 10,004.10 |
| 25 | Putatan | 29.87 |
| 26 | Telupid | 2,210.25 |
| 27 | Kalabakan | 3,880.82 |
| 28 | Membakut | 955.61 |
| 29 | Paitan | 4,065.05 |
| 30 | Sook | 2,803.00 |

**Sumber: Jabatan Tanah & Ukur Sabah**
*Source: Sabah Lands & Surveys Department*

**Jadual 1.12: Kawasan perlindungan yang digazet, Sabah**

*Table 1.12: Gazetted protected area, Sabah*

| Kawasan perlindungan *Protected area* | Keluasan (Hektar) *Area (Hectares)* | Bilangan spesis *Number of species* | | | | |
|---|---|---|---|---|---|---|
| | | Fauna | | | | |
| | | Mamalia *Mammals* | Burung *Birds* | Reptilia *Reptiles* | Amfibia *Amphibians* | Moluska *Molluscs* |
| a. **Taman**/ *Parks* | | | | | | |
| Taman Marin Tun Sakaran | 35,000.0 | 4 | - | 18 | 1 | - |
| Taman Banjaran Crocker | 139,919.0 | 63 | 254 | 110 | 128 | 28 |
| Taman Bukit Tawau | 27,972.0 | 78 | 133 | 155 | 68 | 21 |
| Taman Kinabalu | 75,370.0 | 146 | 355 | 178 | 137 | 69 |
| Taman Pulau Penyu | 1,740.0 | 5 | 20 | 7 | - | 92 |
| Taman Pulau Tiga | 15,864.0 | 10 | 44 | 26 | 3 | 11 |
| Taman Pulau Sipadan | 16,860.0 | - | 50 | 7 | - | 3 |
| Taman Tunku Abdul Rahman | 4,929.0 | 10 | 32 | 37 | 6 | 1 |

| Kawasan perlindungan *Protected area* | Bilangan spesis *Number of species* | | | | | |
|---|---|---|---|---|---|---|
| | Fauna | | | Flora | | |
| | Ikan *Fish* | Cnidarians | Spesies invertebrata yang lain[1] *Other invertebrate species* | Rumpai laut *Seaweeds* | Rumput laut *Sea grass* | Tumbuhan *Plants* |
| a. **Taman**/ *Parks* | | | | | | |
| Taman Marin Tun Sakaran | - | - | 299 | - | - | 220 |
| Taman Banjaran Crocker | 60 | - | 623 | - | - | 1,334 |
| Taman Bukit Tawau | 38 | - | 506 | - | - | 708 |
| Taman Kinabalu | 71 | - | 1,798 | - | - | 4,104 |
| Taman Pulau Penyu | 125 | - | 199 | 22 | 3 | 29 |
| Taman Pulau Tiga | 2 | - | 231 | - | - | 125 |
| Taman Pulau Sipadan | - | - | 191 | - | - | 20 |
| Taman Tunku Abdul Rahman | 2 | - | 179 | - | - | 145 |

**Jadual 1.12: Kawasan perlindungan yang digazet, Sabah (samb)**

*Table 1.12: Gazetted protected area, Sabah (cont'd)*

| Kawasan perlindungan *Protected area* | Keluasan (Hektar) *Area (Hectares)* | Bilangan spesis *Number of species* | | | | |
|---|---|---|---|---|---|---|
| | | Fauna | | | | |
| | | Mamalia *Mammals* | Burung *Birds* | Reptilia *Reptiles* | Amfibia *Amphibians* | Moluska *Molluscs* |
| b. **Rizab Hidupan Liar**/ *Wildlife Reserve* | | | | | | |
| Rizab Hidupan Liar Kulamba Kinabatangan | 20,854.0 | 8 | - | - | - | - |
| Hutan Simpan Tabin (Rezab Hidupan Liar Tabin) | 120,521.0 | 71 | 252 | - | - | - |
| Sugud Islands Marine Conservation Area (SIMCA) | 46,317.0 | 6 | 9 | 3 | - | 103 |
| Hutan Simpan Gua Gomantong | 3,297.0 | 2 | 2 | - | - | - |

| Kawasan perlindungan *Protected area* | Bilangan spesis *Number of species* | | | | | |
|---|---|---|---|---|---|---|
| | Fauna | | | Flora | | |
| | Ikan *Fish* | Cnidarians | Spesies invertebrata yang lain[1] *Other invertebrate species* | Rumpai laut *Seaweeds* | Rumput laut *Sea grass* | Tumbuhan *Plants* |
| b. **Rizab Hidupan Liar**/ *Wildlife Reserve* | | | | | | |
| Rizab Hidupan Liar Kulamba Kinabatangan | - | - | - | - | - | - |
| Hutan Simpan Tabin (Rezab Hidupan Liar Tabin) | - | - | 26 | - | - | 779 |
| Sugud Islands Marine Conservation Area (SIMCA) | 510 | 400 | 99 | 7 | 4 | 3 |
| Hutan Simpan Gua Gomantong | - | - | - | - | - | - |

**Jadual 1.12: Kawasan perlindungan yang digazet, Sabah (samb)**

*Table 1.12: Gazetted protected area, Sabah (cont'd)*

| Kawasan perlindungan *Protected area* | Keluasan (Hektar) *Area (Hectares)* | Bilangan spesis *Number of species* | | | | |
|---|---|---|---|---|---|---|
| | | Fauna | | | | |
| | | Mamalia *Mammals* | Burung *Birds* | Reptilia *Reptiles* | Amfibia *Amphibians* | Moluska *Molluscs* |
| c. **Santuari Hidupan Liar**/ *Wildlife Sanctuaries* | | | | | | |
| Santuari Hidupan Liar Hilir Kinabatangan | 26,103.3 | 11 | 5 | - | - | - |
| Santuari Burung Mantanani | 61.0 | 1 | 4 | 2 | - | - |
| Santuari Burung Kota Belud | 495.0 | - | 5 | - | - | - |
| Santuari Burung Bandaraya Kota Kinabalu | 24.0 | - | 25 | 97 | 6 | 13 |
| Santuari Hidupan Liar Padang Teratak Beaufort | 2,270.0 | 22 | 112 | 4 | 15 | - |
| Hutan Simpan Madai Baturong (Kelas VI) | 111,971.0 | 71 | 252 | - | - | - |
| Pusat Pemulihan Orang Utan Sepilok | 4,294.0 | 299 | 321 | 35 | 22 | - |

| Kawasan perlindungan *Protected area* | Bilangan spesis *Number of species* | | | | | |
|---|---|---|---|---|---|---|
| | Fauna | | | Flora | | |
| | Ikan *Fish* | Cnidarians | Spesies invertebrata yang lain[1] *Other invertebrate species* | Rumpai laut *Seaweeds* | Rumput laut *Sea grass* | Tumbuhan *Plants* |
| c. **Santuari Hidupan Liar**/ *Wildlife Sanctuaries* | | | | | | |
| Santuari Hidupan Liar Hilir Kinabatangan | - | - | - | - | - | - |
| Santuari Burung Mantanani | - | - | - | - | - | - |
| Santuari Burung Kota Belud | - | - | - | - | - | - |
| Santuari Burung Bandaraya Kota Kinabalu | - | - | 44 | - | - | 13 |
| Santuari Hidupan Liar Padang Teratak Beaufort | - | - | - | - | - | 9 |
| Hutan Simpan Madai Baturong (Kelas VI) | - | - | 26 | - | - | 779 |
| Pusat Pemulihan Orang Utan Sepilok | 202 | - | 1,001 | - | - | 10,410 |

**Nota: [1]Lain-lain invertebrat seperti Serangga, Arthropods dan Echinoderms**
Notes: *Other invertebrates like Insects, Arthropods and Echinoderms*

**Meliputi maklumat daripada Jabatan Perlindungan Hidupan Liar dan Taman Negara, Jabatan Perhutanan Semenanjung Malaysia, Jabatan Perikanan dan Perbadanan Taman Negeri Johor**
*Includes information from Department of Wildlife and National Parks, Department of Forestry Peninsular Malaysia, Department of Fisheries, Johor National Parks Corporation,*

**- : Tidak diliputi oleh agensi semasa tahun rujukan Banci Kawasan Perlindungan dan Kepelbagaian Biologi 2014**
*Not covered by the agency during Biodiversity and Protected Areas Census 2014 reference year*

**Jadual 1.13: Kawasan berhutan dan tidak berhutan, Sabah, 2019-2022**

*Table 1.13: Forested and non-forested areas, Sabah, 2019-2022*

| Tahun *Year* | Berhutan *Forested* | | Tidak Berhutan *Non-Forested* | |
|---|---|---|---|---|
| | Hektar *Hectares* | (%) | Hektar *Hectares* | (%) |
| 2019 | 4,679,594 | 63.56 | 2,682,406 | 36.44 |
| 2020 | 4,679,594 | 63.56 | 2,682,480 | 36.44 |
| 2021 | 4,606,475 | 62.57 | 2,755,599 | 37.43 |
| **2022** | **4,606,475** | **62.17** | **2,803,549** | **37.83** |

**Jadual 1.14: Keluasan hutan simpanan kekal, Sabah, 2019-2022**

*Table 1.14: Area of permanent reserved forest, Sabah, 2019-2022*

| Tahun *Year* | 2019 | 2020 | 2021 | **2022** |
|---|---|---|---|---|
| Keluasan *Area* | 3,541,266 | 3,574,468 | 3,574,468 | **3,574,468** |

**Nota: Hutan Simpanan Kekal di Sabah adalah merupakan Hutan Simpan yang diwartakan di bawah Akta Enakmen Hutan 1968 dan Peraturan Hutan 1969 yang terdiri daripada hutan darat, paya gambut, paya laut dan ladang hutan**

*Notes: Permanent Reserve Forest in Sabah reported based on gazetted FR under Forest Enactment 1968 and Forest Rules 1969 consists of Inland forest, peat swamp forest, mangrove forest and forest plantation.*

**Jadual 1.15: Keluasan hutan paya gambut, Sabah, 2019-2022**

*Table 1.15: Area of peat swamp forest, Sabah, 2019-2022*

| Tahun *Year* | 2019 | 2020 | 2021 | **2022** |
|---|---|---|---|---|
| Keluasan *Area* | 53,108 | 53,108 | 52,868 | **52,868** |

**Nota: Bagi Sabah, laporan merujuk kepada luas kawasan litupan hutan paya gambut di dalam Hutan Simpan dan Tanah Kerajaan**

*Notes: For Sabah, the report refers to the area of peat swamp forests within the Forest Reserves and State Land*

**Sumber: Kementerian Sumber Asli dan Kelestraian Alam, Jabatan Perhutanan Semenanjung Malaysia**

*Source: Ministry of Natural Resources and Environmental Sustainability, Forestry Department Peninsular Malaysia*

**Jadual 1.16: Keluasan hutan paya laut, Sabah, 2019-2022**

*Table 1.16: Area of mangrove forest, Sabah, 2019-2022*

Hektar
*Hectares*

| Negeri *State* | 2019 | 2020 | 2021 | **2022** |
|---|---|---|---|---|
| Sabah | 390,526 | 390,526 | 365,764 | **365,764** |

**Sumber: Kementerian Sumber Asli dan Kelestraian Alam, Jabatan Perhutanan Semenanjung Malaysia**

*Source: Ministry of Natural Resources and Environmental Sustainability, Forestry Department Peninsular Malaysia*

**Jadual 1.17: Status kualiti udara mengikut stesen, Johor, 2020-2024**

*Table 1.17: Air quality status by station, Johor, 2020-2024*

Bilangan hari
*Number of days*

| Negeri/ Stesen *State/ Station* | Tahun *Year* | Baik *Good* (0-50) | Sederhana *Moderate* (51-100) | Tidak Sihat *Unhealthy* (101-200) | Sangat Tidak Sihat *Very Unhealthy* (201-300) | Berbahaya *Hazardous* (>300) |
|---|---|---|---|---|---|---|
| Keningau | 2020 | 229 | 137 | - | - | - |
| | 2021 | 231 | 134 | - | - | - |
| | 2022 | 285 | 78 | - | - | - |
| | 2023 | 208 | 153 | - | - | - |
| | **2024** | **222** | **143** | **-** | **-** | **-** |
| Kimanis | 2020 | 296 | 70 | - | - | - |
| | 2021 | 343 | 19 | - | - | - |
| | 2022 | 355 | 9 | - | - | - |
| | 2023 | 322 | 43 | - | - | - |
| | **2024** | **271** | **77** | **18** | **-** | **-** |
| Kota Kinabalu | 2020 | 270 | 96 | - | - | - |
| | 2021 | 307 | 58 | - | - | - |
| | 2022 | 308 | 57 | - | - | - |
| | 2023 | 234 | 130 | - | - | - |
| | **2024** | **219** | **147** | **-** | **-** | **-** |
| Sandakan | 2020 | 292 | 74 | - | - | - |
| | 2021 | 330 | 35 | - | - | - |
| | 2022 | 332 | 33 | - | - | - |
| | 2023 | 282 | 83 | - | - | - |
| | **2024** | **267** | **99** | **-** | **-** | **-** |
| Tawau | 2020 | 358 | 7 | - | - | - |
| | 2021 | 345 | 20 | - | - | - |
| | 2022 | 206 | 156 | - | - | - |
| | 2023 | 136 | 229 | - | - | - |
| | **2024** | **129** | **237** | **-** | **-** | **-** |

**Nota: Stesen yang tidak mencukupi 365 hari adalah disebabkan masalah teknikal**

*Notes: Stations with inadequate 365 days is due to technical problem*

**Sumber: Jabatan Alam Sekitar**

*Source: Department of Environment*

**Jadual 1.18: Bacaan minimum dan maksimum bulanan Indeks Pencemaran Udara (IPU)[1], Sabah, 2024**

*Table 1.18: Monthly minimum and maximum Air Pollutant Index (API), Sabah, 2024*

| Stesen *Station* | Jan. | | Feb. | | Mac *Mar.* | | Apr. | | Mei *May* | | Jun *June* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Min. | Maks. *Max.* | Min. | Maks. *Max.* | Min. | Maks. *Max.* | Min. | Maks. *Max.* | Min. | Maks. *Max.* | Min. | Maks. *Max.* |
| Keningau | 24 | 62 | 26 | 58 | 28 | 57 | 27 | 59 | 26 | 59 | 19 | 55 |
| Kimanis | 11 | 61 | 15 | 67 | 47 | 176 | 19 | 178 | 10 | 41 | 12 | 36 |
| Kota Kinabalu | 17 | 59 | 30 | 66 | 47 | 83 | 16 | 58 | 14 | 55 | 12 | 38 |
| Sandakan | 22 | 50 | 24 | 51 | 28 | 62 | 20 | 54 | 20 | 53 | 17 | 56 |
| Tawau | 25 | 59 | 38 | 92 | 28 | 64 | 26 | 67 | 22 | 55 | 24 | 61 |

| Stesen *Station* | Julai *July* | | Ogos *Aug.* | | Sept. | | Okt. *Oct.* | | Nov. | | Dis. *Dec.* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Min. | Maks. *Max.* | Min. | Maks. *Max.* | Min. | Maks. *Max.* | Min. | Maks. *Max.* | Min. | Maks. *Max.* | Min. | Maks. *Max.* |
| Keningau | 16 | 66 | 20 | 55 | 26 | 71 | 16 | 63 | 18 | 63 | 14 | 57 |
| Kimanis | 13 | 62 | 11 | 53 | 12 | 63 | 16 | 60 | 13 | 57 | 10 | 47 |
| Kota Kinabalu | 10 | 67 | 15 | 52 | 22 | 72 | 16 | 63 | 13 | 64 | 13 | 55 |
| Sandakan | 18 | 56 | 26 | 54 | 21 | 70 | 21 | 59 | 26 | 62 | 15 | 52 |
| Tawau | 24 | 63 | 24 | 57 | 30 | 87 | 21 | 69 | 31 | 63 | 20 | 57 |

**Nota: [1] Bacaan status kualiti udara berdasarkan bacaan maksimum harian**
Notes: *Air quality status readings are based on daily maximum readings*

**Sumber: Jabatan Alam Sekitar**
*Source: Department of Environment*

**Status Indeks Pencemaran Udara (IPU)**
*Air Pollutant Index (API) status*

| IPU/ *API* | Status IPU / *API status* |
|---|---|
| 0-50 | Baik / *Good* |
| 51-100 | Sederhana / *Moderate* |
| 101-200 | Tidak Sihat / *Unhealthy* |
| 201-300 | Sangat Tidak Sihat / *Very Unhealthy* |
| >300 | Berbahaya / *Hazardous* |

**Jadual 1.19: Purata tahunan kepekatan berdasarkan jenis bahan pencemar di udara, Sabah, 2020-2024**

*Table 1.19: Annually average concentration based on the type of air pollutants in the air, Sabah, 2020-2024*

| Stesen *Station* | Tahun *Year* | Habuk Halus ($PM_{2.5}$) *Particulate Matter* ($\mu g/m^3$) | Habuk Halus ($PM_{10}$) *Particulate Matter* ($\mu g/m^3$) | Ozon Permukaan Bumi ($O_3$) *Ground Level Ozone* (ppm) | Karbon Monoksida (CO) *Carbon Monoxide* (ppm) | Sulfur Dioksida ($SO_2$) *Sulphur Dioxide* (ppm) | Nitrogen Dioksida ($NO_2$) *Nitrogen Dioxide* (ppm) |
|---|---|---|---|---|---|---|---|
| Keningau | 2020 | 9.72[r] | 16.62[r] | 0.009 | 0.626[r] | 0.0012 | 0.0025 |
| | 2021 | 10.12[r] | 18.84[r] | 0.009 | 0.594[r] | 0.0014 | 0.0026[r] |
| | 2022 | 8.36[r] | 16.71[r] | 0.009 | 0.518[r] | 0.0014 | 0.0023 |
| | 2023 | 10.49[r] | 17.54[r] | 0.011 | 0.499[r] | 0.0014 | 0.0026 |
| | **2024** | **10.34** | **18.74** | **0.010** | **0.346** | **0.0014** | **0.0028** |
| Kimanis | 2020 | 7.46[r] | 15.64[r] | - | - | 0.0007 | 0.0015 |
| | 2021 | 5.41[r] | 11.84[r] | - | - | 0.0008[r] | 0.0014 |
| | 2022 | 4.48 | 11.53[r] | - | - | 0.0007 | 0.0019[r] |
| | 2023 | 6.34 | 13.67 | - | - | 0.0006 | 0.0018 |
| | **2024** | **10.64** | **17.00** | - | - | **0.0007** | **0.0018** |
| Kota Kinabalu | 2020 | 7.96[r] | 16.85[r] | 0.013 | 0.400[r] | 0.001 | 0.0024 |
| | 2021 | 7.67 | 19.55[r] | 0.012 | 0.345[r] | 0.0011 | 0.0027 |
| | 2022 | 7.76[r] | 15.77[r] | 0.010 | 0.274 | 0.0009 | 0.0029 |
| | 2023 | 10.11[r] | 22.82[r] | 0.010 | 0.360[r] | 0.0010 | 0.0036 |
| | **2024** | **10.84** | **22.50** | **0.010** | **0.559** | **0.0012** | **0.0034** |
| Sandakan | 2020 | 9.28[r] | 15.39[r] | 0.014 | 0.531 | 0.0007 | 0.0035 |
| | 2021 | 7.77[r] | 14.20[r] | 0.014 | 0.500[r] | 0.0008 | 0.0036[r] |
| | 2022 | 7.80[r] | 12.24 | 0.013 | 0.591[r] | 0.0008 | 0.0044 |
| | 2023 | 9.16 | 14.68 | 0.016 | 0.517[r] | 0.0009 | 0.0043 |
| | **2024** | **9.42** | **16.48** | **0.015** | **0.532** | **0.0009** | **0.0044** |
| Tawau | 2020 | 6.56 | 16.12[r] | 0.011 | 0.626[r] | 0.0006 | 0.0043 |
| | 2021 | 7.08 | 14.67 | 0.010 | 0.524 | 0.0008 | 0.0047 |
| | 2022 | 10.64[r] | 21.72 | 0.009 | 0.519 | 0.0011 | 0.0051[r] |
| | 2023 | 12.49[r] | 23.20[r] | 0.012 | 0.485 | 0.0014 | 0.0055 |
| | **2024** | **12.51** | **24.15** | **0.011** | **0.508** | **0.0011** | **0.0051** |

**Sumber: Jabatan Alam Sekitar**

*Source: Department of Environment*

**Jadual 1.20: Purata bulanan kepekatan Habuk Halus ($PM_{2.5}$) di udara, Sabah, 2020-2024**

*Table 1.20: Monthly average concentration of Particulate Matter ($PM_{2.5}$) in the air, Sabah, 2020-2024*

µg/m³

| Stesen *Station* | Tahun *Year* | Jan. | Feb. | Mac *Mar.* | Apr. | Mei *May* | Jun *June* | Julai *July* | Ogos *Aug.* | Sept. | Okt. *Oct.* | Nov. | Dis. *Dec.* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Keningau | 2020 | 10.50 | 10.62 | 11.62 | 12.07 | 8.34 | 7.22 | 6.80 | 11.10 | 8.75 | 11.43 | 9.49 | 8.70 |
| | 2021 | 8.20 | 10.36 | 10.56 | 13.17 | 9.29 | 11.90 | 13.30 | 9.85 | 7.12 | 10.93 | 7.41 | 9.41 |
| | 2022 | 8.55 | 7.66 | 8.32 | 9.07 | 7.76 | 8.61 | 9.27 | 9.25 | 9.01 | 7.35 | 6.57 | 8.90 |
| | 2023 | 8.80 | 8.90 | 10.07 | 10.93 | 9.66 | 10.26 | 12.00 | 12.01 | 12.51 | 11.15 | 10.07 | 9.56 |
| | **2024** | **9.46** | **10.30** | **10.63** | **11.74** | **10.62** | **9.00** | **11.42** | **9.82** | **13.41** | **10.00** | **9.65** | **8.08** |
| Kimanis | 2020 | 7.73 | 16.27 | 14.99 | 11.75 | 6.96 | 3.81 | 3.93 | 5.44 | 4.06 | 5.11 | 4.88 | 4.63 |
| | 2021 | 3.97 | 6.66 | 6.91 | 10.80 | 4.42 | 4.14 | 5.34 | 4.45 | 4.29 | 6.38 | 3.78 | 3.78 |
| | 2022 | 6.10 | 4.60 | 4.69 | 6.05 | 4.80 | 3.85 | 4.85 | 4.78 | 3.56 | 3.24 | 3.10 | 4.13 |
| | 2023 | 4.32 | 5.47 | 7.09 | 10.01 | 6.59 | 7.16 | 6.86 | 8.04 | 6.14 | 6.24 | 3.12 | 5.04 |
| | **2024** | **7.29** | **10.32** | **37.04** | **18.30** | **4.81** | **5.55** | **8.87** | **5.22** | **9.22** | **8.37** | **7.18** | **5.56** |
| Kota Kinabalu | 2020 | 10.30 | 13.97 | 12.77 | 9.96 | 6.91 | 5.46 | 4.85 | 7.93 | 5.73 | 6.01 | 6.05 | 5.63 |
| | 2021 | 5.43 | 7.58 | 9.33 | 9.36 | 7.02 | 7.50 | 8.12 | 6.90 | 6.29 | 8.12 | 6.89 | 9.49 |
| | 2022 | 9.51 | 9.21 | 7.30 | 8.85 | 8.44 | 6.02 | 7.96 | 7.23 | 6.73 | 7.72 | 6.40 | 7.74 |
| | 2023 | 9.24 | 10.57 | 10.65 | 11.76 | 9.90 | 9.22 | 9.98 | 11.53 | 14.37 | 11.18 | 6.55 | 6.35 |
| | **2024** | **10.11** | **13.97** | **22.36** | **10.30** | **8.20** | **6.20** | **10.43** | **7.57** | **13.09** | **10.39** | **8.96** | **8.51** |
| Sandakan | 2020 | 8.56 | 9.69 | 10.14 | 9.88 | 8.54 | 8.88 | 9.33 | 9.11 | 9.67 | 10.01 | 9.47 | 8.03 |
| | 2021 | 5.88 | 7.01 | 7.86 | 10.04 | 6.79 | 7.55 | 9.04 | 7.74 | 6.55 | 9.33 | 7.86 | 7.60 |
| | 2022 | 8.68 | 7.61 | 7.50 | 8.55 | 6.81 | 7.77 | 8.08 | 8.83 | 7.74 | 7.85 | 6.80 | 7.36 |
| | 2023 | 6.72 | 8.45 | 9.34 | 11.40 | 8.25 | 7.72 | 9.31 | 10.28 | 10.95 | 11.91 | 8.42 | 7.18 |
| | **2024** | **8.15** | **8.26** | **10.59** | **9.64** | **8.65** | **8.53** | **9.64** | **9.86** | **11.65** | **10.56** | **10.72** | **6.81** |
| Tawau | 2020 | 7.18 | 6.85 | 6.91 | 7.33 | 6.10 | 6.88 | 7.19 | 6.46 | 5.41 | 4.95 | 6.78 | 6.64 |
| | 2021 | 6.21 | 7.30 | 7.63 | 7.47 | 6.32 | 7.17 | 6.31 | 6.13 | 6.24 | 7.22 | 6.41 | 10.52 |
| | 2022 | 12.30 | 11.21 | 10.77 | 10.76 | 10.89 | 11.76 | 10.00 | 10.18 | 9.65 | 9.52 | 10.07 | 10.52 |
| | 2023 | 10.57 | 11.52 | 13.47 | 12.74 | 9.26 | 11.11 | 12.29 | 13.25 | 14.82 | 17.79 | 11.47 | 11.62 |
| | **2024** | **12.96** | **16.89** | **13.36** | **12.59** | **10.13** | **9.79** | **12.02** | **11.51** | **15.78** | **13.17** | **12.22** | **9.65** |

**Nota: Garis Panduan Kualiti Udara Malaysia: $PM_{2.5}$ tidak melebihi 50 µg/m³**
*Notes: Malaysian Ambient Air Quality Guidelines: $PM_{2.5}$ not exceeding 50 µg/m³*

**Sumber: Jabatan Alam Sekitar**
*Source: Department of Environment*

**Jadual 1.21: Purata bulanan kepekatan Habuk Halus ($PM_{10}$) di udara, Sabah, 2020-2024**

*Table 1.21: Monthly average concentration of Particulate Matter ($PM_{10}$) in the air, Sabah, 2020-2024*

µg/m³

| Stesen *Station* | Tahun *Year* | Jan. | Feb. | Mac *Mar.* | Apr. | Mei *May* | Jun *June* | Julai *July* | Ogos *Aug.* | Sept. | Okt. *Oct.* | Nov. | Dis. *Dec.* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Keningau | 2020 | 17.87 | 18.21 | 18.63 | 18.86 | 16.34 | 14.30 | 12.91 | 14.68 | 14.59 | 17.64 | 16.83 | 18.52 |
| | 2021 | 16.74 | 18.83 | 20.20 | 22.93 | 20.23 | 20.58 | 21.27 | 16.92 | 15.61 | 19.06 | 16.71 | 17.02 |
| | 2022 | 16.74 | 15.13 | 16.26 | 16.22 | 16.32 | 17.48 | 19.61 | 19.37 | 19.39 | 15.10 | 13.33 | 15.59 |
| | 2023 | 14.67 | 16.02 | 17.13 | 17.75 | 16.93 | 17.07 | 21.36 | 19.41 | 18.99 | 17.60 | 15.86 | 17.72 |
| | **2024** | **17.38** | **17.12** | **16.86** | **19.23** | **22.34** | **18.48** | **19.85** | **18.28** | **22.75** | **17.92** | **17.75** | **16.91** |
| Kimanis | 2020 | 17.87 | 32.92 | 25.18 | 20.76 | 13.55 | 10.86 | 10.45 | 12.07 | 10.93 | 10.17 | 10.82 | 12.11 |
| | 2021 | 11.03 | 15.70 | 16.18 | 19.93 | 11.28 | 6.69 | 6.21 | 10.09 | 10.74 | 13.81 | 8.55 | 11.92 |
| | 2022 | 15.27 | 13.42 | 11.28 | 14.41 | 12.21 | 11.79 | 12.12 | 13.12 | 9.22 | 7.80 | 5.74 | 11.94 |
| | 2023 | 12.30 | 12.85 | 17.04 | 18.02 | 14.62 | 15.46 | 14.89 | 10.53 | 13.05 | 13.44 | 10.42 | 11.46 |
| | **2024** | **14.63** | **19.17** | **50.10** | **30.11** | **8.78** | **9.56** | **13.91** | **9.10** | **12.57** | **11.91** | **12.64** | **11.54** |
| Kota Kinabalu | 2020 | 23.69 | 29.44 | 25.17 | 19.93 | 16.46 | 13.22 | 9.87 | 14.03 | 10.57 | 7.44 | 14.22 | 18.12 |
| | 2021 | 17.25 | 21.38 | 23.65 | 23.13 | 23.57 | 16.40 | 18.24 | 18.30 | 18.20 | 21.34 | 16.93 | 16.21 |
| | 2022 | 13.19 | 15.82 | 12.69 | 20.36 | 20.20 | 11.46 | 9.55 | 10.81 | 16.48 | 18.21 | 20.19 | 20.27 |
| | 2023 | 21.44 | 24.47 | 24.00 | 23.88 | 22.01 | 20.11 | 22.45 | 24.54 | 29.21 | 20.57 | 17.76 | 23.41 |
| | **2024** | **35.37** | **29.92** | **37.33** | **20.58** | **20.52** | **14.56** | **16.16** | **13.17** | **20.45** | **20.86** | **20.26** | **20.83** |
| Sandakan | 2020 | 16.84 | 20.31 | 17.65 | 14.90 | 13.10 | 13.91 | 13.77 | 14.34 | 15.42 | 15.48 | 14.92 | 14.10 |
| | 2021 | 12.03 | 15.53 | 14.95 | 17.01 | 12.66 | 12.10 | 14.98 | 12.66 | 12.54 | 15.92 | 14.79 | 15.27 |
| | 2022 | 17.78 | 16.16 | 14.12 | 15.27 | 11.28 | 9.86 | 10.53 | 11.22 | 10.19 | 10.48 | 9.56 | 10.48 |
| | 2023 | 9.42 | 12.35 | 13.09 | 13.93 | 10.92 | 17.61 | 17.07 | 16.51 | 17.35 | 18.13 | 15.05 | 14.70 |
| | **2024** | **18.32** | **19.72** | **19.48** | **16.34** | **13.31** | **14.78** | **15.70** | **15.01** | **17.86** | **16.43** | **17.26** | **13.55** |
| Tawau | 2020 | 13.83 | 13.60 | 12.35 | 13.19 | 12.85 | 20.23 | 14.27 | 23.00 | 11.86 | 18.27 | 25.73 | 14.30 |
| | 2021 | 13.08 | 15.63 | 16.26 | 14.88 | 12.95 | 12.92 | 12.71 | 12.11 | 13.14 | 14.50 | 14.80 | 23.09 |
| | 2022 | 25.55 | 22.99 | 22.29 | 22.27 | 22.37 | 23.05 | 20.07 | 19.45 | 19.41 | 20.29 | 21.48 | 21.38 |
| | 2023 | 21.25 | 24.00 | 25.75 | 23.00 | 18.96 | 20.36 | 20.74 | 23.58 | 24.57 | 28.20 | 23.08 | 24.91 |
| | **2024** | **26.48** | **27.80** | **25.35** | **26.10** | **19.30** | **20.40** | **24.40** | **22.21** | **29.72** | **24.25** | **23.72** | **20.12** |

**Nota: Garis Panduan Kualiti Udara Malaysia: $PM_{10}$ tidak melebihi 120 µg/m³**
*Notes: Malaysian Ambient Air Quality Guidelines: $PM_{10}$ not exceeding 120 µg/m³ within*

**Sumber: Jabatan Alam Sekitar**
*Source: Department of Environment*

**Jadual 1.22: Purata bulanan kepekatan Ozon Permukaan Bumi ($O_3$) di udara, Sabah, 2020-2024**

*Table 1.22: Monthly average concentration of Ground Level ozone ($O_3$) in the air, Sabah, 2020-2024*

µg/m³

| Stesen *Station* | Tahun *Year* | Jan. | Feb. | Mac *Mar.* | Apr. | Mei *May* | Jun *June* | Julai *July* | Ogos *Aug.* | Sept. | Okt. *Oct.* | Nov. | Dis. *Dec.* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Keningau | 2020 | 0.013 | 0.015 | 0.016 | 0.012 | 0.011 | 0.008 | 0.008 | 0.012 | 0.013 | 0.007 | 0.010 | 0.010 |
| | 2021 | 0.010 | 0.013 | 0.011 | 0.013 | 0.008 | 0.006 | 0.005 | 0.008 | 0.006 | 0.008 | 0.008 | 0.008 |
| | 2022 | 0.009 | 0.011 | 0.009 | 0.012 | 0.008 | 0.007 | 0.009 | 0.008 | 0.007 | 0.009 | 0.007 | 0.009 |
| | 2023 | 0.010 | 0.011 | 0.013 | 0.014 | 0.012 | 0.011 | 0.010 | 0.011 | 0.011 | 0.010 | 0.010 | 0.010 |
| | **2024** | **0.011** | **0.012** | **0.015** | **0.014** | **0.011** | **0.007** | **0.010** | **0.009** | **0.010** | **0.011** | **0.008** | **0.006** |
| Kota Kinabalu | 2020 | 0.013 | 0.015 | 0.014 | 0.016 | 0.012 | 0.011 | 0.009 | 0.013 | 0.010 | 0.013 | 0.013 | 0.013 |
| | 2021 | 0.012 | 0.015 | 0.013 | 0.016 | 0.011 | 0.012 | 0.014 | 0.012 | 0.011 | 0.012 | 0.009 | 0.011 |
| | 2022 | 0.011 | 0.010 | 0.009 | 0.012 | 0.011 | 0.009 | 0.010 | 0.009 | 0.010 | 0.010 | 0.008 | 0.012 |
| | 2023 | 0.008 | 0.009 | 0.010 | 0.012 | 0.011 | 0.011 | 0.010 | 0.010 | 0.010 | 0.009 | 0.009 | 0.009 |
| | **2024** | **0.010** | **0.012** | **0.013** | **0.011** | **0.009** | **0.009** | **0.010** | **0.008** | **0.012** | **0.012** | **0.009** | **0.010** |
| Sandakan | 2020 | 0.020 | 0.024 | 0.019 | 0.020 | 0.013 | 0.010 | 0.009 | 0.012 | 0.009 | 0.012 | 0.014 | 0.013 |
| | 2021 | 0.015 | 0.020 | 0.015 | 0.018 | 0.014 | 0.013 | 0.014 | 0.011 | 0.011 | 0.012 | 0.011 | 0.018 |
| | 2022 | 0.018 | 0.016 | 0.011 | 0.014 | 0.012 | 0.010 | 0.011 | 0.011 | 0.012 | 0.011 | 0.012 | 0.015 |
| | 2023 | 0.016 | 0.018 | 0.023 | 0.018 | 0.018 | 0.015 | 0.014 | 0.015 | 0.014 | 0.013 | 0.012 | 0.015 |
| | **2024** | **0.021** | **0.023** | **0.021** | **0.015** | **0.012** | **0.011** | **0.013** | **0.011** | **0.015** | **0.014** | **0.011** | **0.013** |
| Tawau | 2020 | 0.012 | 0.016 | 0.013 | 0.015 | 0.010 | 0.008 | 0.007 | 0.009 | 0.008 | 0.010 | 0.009 | 0.010 |
| | 2021 | 0.009 | 0.012 | 0.011 | 0.013 | 0.010 | 0.009 | 0.010 | 0.008 | 0.009 | 0.009 | 0.008 | 0.010 |
| | 2022 | 0.011 | 0.010 | 0.009 | 0.010 | 0.008 | 0.008 | 0.010 | 0.009 | 0.009 | 0.009 | 0.009 | 0.010 |
| | 2023 | 0.010 | 0.010 | 0.013 | 0.013 | 0.014 | 0.012 | 0.011 | 0.012 | 0.014 | 0.012 | 0.010 | 0.010 |
| | **2024** | **0.012** | **0.014** | **0.014** | **0.010** | **0.009** | **0.009** | **0.011** | **0.009** | **0.013** | **0.011** | **0.007** | **0.009** |

**Nota: Garis Panduan Kualiti Udara Malaysia: $O_3$ tidak melebihi 0.1 ppm**
*Notes: Malaysian Ambient Air Quality Guidelines: $O_3$ not exceeding 0.1 ppm*

**Sumber: Jabatan Alam Sekitar**
*Source: Department of Environment*

**Jadual 1.23: Purata bulanan kepekatan Karbon Monoksida (CO) di udara, Sabah, 2020-2024**

*Table 1.23: Monthly average concentration of Carbon Monoxide (CO) in the air, Sabah, 2020-2024*

µg/m$^3$

| Stesen *Station* | Tahun *Year* | Jan. | Feb. | Mac *Mar.* | Apr. | Mei *May* | Jun *June* | Julai *July* | Ogos *Aug.* | Sept. | Okt. *Oct.* | Nov. | Dis. *Dec.* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Keningau | 2020 | 0.665 | 0.630 | 0.690 | 0.635 | 0.649 | 0.665 | 0.610 | 0.557 | 0.599 | 0.618 | 0.596 | 0.594 |
| | 2021 | 0.592 | 0.608 | 0.596 | 0.649 | 0.619 | 0.635 | 0.623 | 0.385 | 0.618 | 0.606 | 0.618 | 0.584 |
| | 2022 | 0.568 | 0.611 | 0.617 | 0.648 | 0.431 | 0.439 | 0.311 | 0.321 | 0.600 | 0.518 | 0.574 | 0.580 |
| | 2023 | 0.549 | 0.600 | 0.492 | 0.624 | 0.491 | 0.522 | 0.655 | 0.463 | 0.287 | 0.514 | 0.335 | 0.458 |
| | **2024** | **0.586** | **0.552** | **0.459** | **0.371** | **0.384** | **0.242** | **0.300** | **0.184** | **0.235** | **0.246** | **0.300** | **0.297** |
| Kota Kinabalu | 2020 | 0.359 | 0.497 | 0.531 | 0.558 | 0.564 | 0.332 | 0.411 | 0.494 | 0.326 | 0.264 | 0.228 | 0.241 |
| | 2021 | 0.337 | 0.445 | 0.347 | 0.478 | 0.231 | 0.214 | 0.331 | 0.390 | 0.390 | 0.355 | 0.303 | 0.315 |
| | 2022 | 0.198 | 0.371 | 0.373 | 0.484 | 0.412 | 0.278 | 0.250 | 0.217 | 0.146 | 0.210 | 0.166 | 0.182 |
| | 2023 | 0.221 | 0.212 | 0.209 | 0.251 | 0.267 | 0.278 | 0.368 | 0.497 | 0.630 | 0.574 | 0.438 | 0.370 |
| | **2024** | **0.675** | **0.722** | **0.793** | **0.582** | **0.526** | **0.326** | **0.444** | **0.550** | **0.528** | **0.528** | **0.560** | **0.478** |
| Sandakan | 2020 | 0.478 | 0.488 | 0.568 | 0.435 | 0.567 | 0.558 | 0.554 | 0.537 | 0.524 | 0.519 | 0.542 | 0.600 |
| | 2021 | 0.493 | 0.443 | 0.397 | 0.453 | 0.528 | 0.478 | 0.512 | 0.451 | 0.470 | 0.625 | 0.570 | 0.584 |
| | 2022 | 0.656 | 0.608 | 0.626 | 0.612 | 0.556 | 0.580 | 0.567 | 0.544 | 0.570 | 0.584 | 0.568 | 0.616 |
| | 2023 | 0.546 | 0.403 | 0.499 | 0.600 | 0.583 | 0.524 | 0.389 | 0.552 | 0.544 | 0.538 | 0.471 | 0.555 |
| | **2024** | **0.560** | **0.539** | **0.557** | **0.541** | **0.525** | **0.507** | **0.418** | **0.475** | **0.551** | **0.615** | **0.542** | **0.550** |
| Tawau | 2020 | 0.593 | 0.585 | 0.540 | 0.636 | 0.536 | 0.553 | 0.664 | 0.732 | 0.678 | 0.630 | 0.682 | 0.679 |
| | 2021 | 0.656 | 0.601 | 0.681 | 0.698 | 0.533 | 0.456 | 0.555 | 0.389 | 0.386 | 0.523 | 0.385 | 0.421 |
| | 2022 | 0.487 | 0.462 | 0.406 | 0.428 | 0.501 | 0.531 | 0.513 | 0.583 | 0.525 | 0.538 | 0.601 | 0.652 |
| | 2023 | 0.547 | 0.444 | 0.563 | 0.500 | 0.396 | 0.444 | 0.427 | 0.428 | 0.501 | 0.665 | 0.416 | 0.486 |
| | **2024** | **0.579** | **0.489** | **0.552** | **0.575** | **0.379** | **0.506** | **0.467** | **0.507** | **0.456** | **0.449** | **0.542** | **0.596** |

**Nota: Garis Panduan Kualiti Udara Malaysia: CO tidak melebihi 9 ppm**
*Notes: Malaysian Ambient Air Quality Guidelines: CO not exceeding 9 ppm*

**Sumber: Jabatan Alam Sekitar**
*Source: Department of Environment*

**Jadual 1.24: Purata bulanan kepekatan Sulfur Dioksida ($SO_2$) di udara, Sabah, 2020-2024**

*Table 1.24: Monthly average concentration of Sulphur Dioxide ($SO_2$) in the air, Sabah, 2020-2024*

µg/m³

| Stesen *Station* | Tahun *Year* | Jan. | Feb. | Mac *Mar.* | Apr. | Mei *May* | Jun *June* | Julai *July* | Ogos *Aug.* | Sept. | Okt. *Oct.* | Nov. | Dis. *Dec.* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Keningau | 2020 | 0.0017 | 0.0013 | 0.0007 | 0.0008 | 0.0009 | 0.0011 | 0.0012 | 0.0010 | 0.0012 | 0.0014 | 0.0015 | 0.0011 |
| | 2021 | 0.0013 | 0.0015 | 0.0016 | 0.0019 | 0.0016 | 0.0013 | 0.0016 | 0.0017 | 0.0008 | 0.0010 | 0.0011 | 0.0014 |
| | 2022 | 0.0016 | 0.0012 | 0.0011 | 0.0012 | 0.0014 | 0.0018 | 0.0011 | 0.0013 | 0.0016 | 0.0015 | 0.0014 | 0.0017 |
| | 2023 | 0.0020 | 0.0017 | 0.0012 | 0.0012 | 0.0014 | 0.0016 | 0.0013 | 0.0012 | 0.0014 | 0.0017 | 0.0013 | 0.0011 |
| | **2024** | **0.0014** | **0.0017** | **0.0013** | **0.0016** | **0.0013** | **0.0006** | **0.0011** | **0.0014** | **0.0015** | **0.0019** | **0.0013** | **0.0015** |
| Kimanis | 2020 | 0.0007 | 0.0008 | 0.0008 | 0.0008 | 0.0005 | 0.0005 | 0.0007 | 0.0006 | 0.0006 | 0.0008 | 0.0006 | 0.0005 |
| | 2021 | 0.0009 | 0.0008 | 0.0006 | 0.0008 | 0.0009 | 0.0008 | 0.0008 | 0.0009 | 0.0005 | 0.0005 | 0.0007 | 0.0009 |
| | 2022 | 0.0008 | 0.0008 | 0.0008 | 0.0009 | 0.0009 | 0.0006 | 0.0006 | 0.0005 | 0.0006 | 0.0007 | 0.0008 | 0.0007 |
| | 2023 | 0.0007 | 0.0007 | 0.0005 | 0.0004 | 0.0005 | 0.0009 | 0.0008 | 0.0005 | 0.0006 | 0.0004 | 0.0003 | 0.0004 |
| | **2024** | **0.0005** | **0.0006** | **0.0010** | **0.0006** | **0.0006** | **0.0007** | **0.0008** | **0.0006** | **0.0007** | **0.0007** | **0.0007** | **0.0005** |
| Kota Kinabalu | 2020 | 0.0011 | 0.0015 | 0.0014 | 0.0007 | 0.0007 | 0.0011 | 0.0011 | 0.0008 | 0.0005 | 0.0005 | 0.0010 | 0.0014 |
| | 2021 | 0.0008 | 0.0007 | 0.0007 | 0.0009 | 0.0008 | 0.0011 | 0.0014 | 0.0015 | 0.0018 | 0.0010 | 0.0011 | 0.0011 |
| | 2022 | 0.0011 | 0.0012 | 0.0012 | 0.0011 | 0.0008 | 0.0005 | 0.0006 | 0.0005 | 0.0008 | 0.0010 | 0.0011 | 0.0010 |
| | 2023 | 0.0009 | 0.0009 | 0.0008 | 0.0008 | 0.0008 | 0.0010 | 0.0011 | 0.0013 | 0.0015 | 0.0010 | 0.0011 | 0.0006 |
| | **2024** | **0.0012** | **0.0013** | **0.0017** | **0.0012** | **0.0010** | **0.0011** | **0.0016** | **0.0011** | **0.0011** | **0.0012** | **0.0007** | **0.0007** |
| Sandakan | 2020 | 0.0009 | 0.0008 | 0.0008 | 0.0008 | 0.0007 | 0.0007 | 0.0008 | 0.0004 | 0.0006 | 0.0007 | 0.0007 | 0.0006 |
| | 2021 | 0.0008 | 0.0009 | 0.0005 | 0.0007 | 0.0008 | 0.0009 | 0.0009 | 0.0009 | 0.0009 | 0.0009 | 0.0009 | 0.0009 |
| | 2022 | 0.0009 | 0.0009 | 0.0010 | 0.0007 | 0.0006 | 0.0009 | 0.0009 | 0.0009 | 0.0008 | 0.0007 | 0.0008 | 0.0010 |
| | 2023 | 0.0006 | 0.0007 | 0.0009 | 0.0009 | 0.0007 | 0.0009 | 0.0009 | 0.0009 | 0.0011 | 0.0012 | 0.0008 | 0.0009 |
| | **2024** | **0.0008** | **0.0006** | **0.0008** | **0.0008** | **0.0009** | **0.0008** | **0.0008** | **0.0010** | **0.0010** | **0.0009** | **0.0011** | **0.0011** |
| Tawau | 2020 | 0.0005 | 0.0006 | 0.0005 | 0.0004 | 0.0004 | 0.0005 | 0.0007 | 0.0008 | 0.0008 | 0.0008 | 0.0008 | 0.0006 |
| | 2021 | 0.0006 | 0.0008 | 0.0009 | 0.0009 | 0.0007 | 0.0009 | 0.0005 | 0.0007 | 0.0009 | 0.0009 | 0.0010 | 0.0010 |
| | 2022 | 0.0010 | 0.0010 | 0.0010 | 0.0009 | 0.0010 | 0.0013 | 0.0012 | 0.0011 | 0.0010 | 0.0012 | 0.0011 | 0.0011 |
| | 2023 | 0.0012 | 0.0012 | 0.0013 | 0.0012 | 0.0010 | 0.0011 | 0.0011 | 0.0017 | 0.0018 | 0.0017 | 0.0015 | 0.0015 |
| | **2024** | **0.0012** | **0.0016** | **0.0014** | **0.0012** | **0.0011** | **0.0009** | **0.0008** | **0.0009** | **0.0009** | **0.0010** | **0.0012** | **0.0012** |

**Nota: Garis Panduan Kualiti Udara Malaysia: $SO_2$ tidak melebihi 0.035 ppm**
*Notes: Malaysian Ambient Air Quality Guidelines: $SO_2$ not exceeding 0.035 ppm*

**Sumber: Jabatan Alam Sekitar**
*Source: Department of Environment*

**Jadual 1.25: Purata bulanan kepekatan Nitrogen Dioksida ($NO_2$) di udara, Sabah, 2020-2024**

*Table 1.25: Monthly average concentration of Nitrogen Dioxide ($NO_2$) in the air, Sabah, 2020-2024*

µg/m³

| Stesen *Station* | Tahun *Year* | Jan. | Feb. | Mac *Mar.* | Apr. | Mei *May* | Jun *June* | Julai *July* | Ogos *Aug.* | Sept. | Okt. *Oct.* | Nov. | Dis. *Dec.* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Keningau | 2020 | 0.0032 | 0.0030 | 0.0030 | 0.0018 | 0.0021 | 0.0022 | 0.0020 | 0.0028 | 0.0024 | 0.0029 | 0.0023 | 0.0024 |
| | 2021 | 0.0019 | 0.0026 | 0.0023 | 0.0030 | 0.0023 | 0.0023 | 0.0030 | 0.0023 | 0.0025 | 0.0033 | 0.0024 | 0.0027 |
| | 2022 | 0.0022 | 0.0017 | 0.0021 | 0.0028 | 0.0026 | 0.0025 | 0.0026 | 0.0022 | 0.0021 | 0.0023 | 0.0020 | 0.0029 |
| | 2023 | 0.0025 | 0.0022 | 0.0020 | 0.0023 | 0.0033 | 0.0027 | 0.0030 | 0.0032 | 0.0028 | 0.0026 | 0.0023 | 0.0021 |
| | **2024** | **0.0020** | **0.0019** | **0.0022** | **0.0027** | **0.0024** | **0.0031** | **0.0035** | **0.0029** | **0.0040** | **0.0031** | **0.0026** | **0.0031** |
| Kimanis | 2020 | 0.0024 | 0.0029 | 0.0018 | 0.0012 | 0.0010 | 0.0014 | 0.0011 | 0.0016 | 0.0013 | 0.0010 | 0.0012 | 0.0012 |
| | 2021 | 0.0013 | 0.0016 | 0.0014 | 0.0016 | 0.0013 | 0.0012 | 0.0016 | 0.0014 | 0.0014 | 0.0012 | 0.0011 | 0.0013 |
| | 2022 | 0.0019 | 0.0018 | 0.0018 | 0.0020 | 0.0020 | 0.0017 | 0.0016 | 0.0017 | 0.0016 | 0.0016 | 0.0024 | 0.0022 |
| | 2023 | 0.0025 | 0.0024 | 0.0022 | 0.0017 | 0.0018 | 0.0015 | 0.0015 | 0.0018 | 0.0015 | 0.0016 | 0.0015 | 0.0015 |
| | **2024** | **0.0019** | **0.0024** | **0.0033** | **0.0020** | **0.0014** | **0.0014** | **0.0017** | **0.0014** | **0.0017** | **0.0015** | **0.0014** | **0.0016** |
| Kota Kinabalu | 2020 | 0.0033 | 0.0042 | 0.0026 | 0.0012 | 0.0014 | 0.0019 | 0.0018 | 0.0028 | 0.0025 | 0.0020 | 0.0022 | 0.0024 |
| | 2021 | 0.0027 | 0.0026 | 0.0028 | 0.0030 | 0.0027 | 0.0022 | 0.0029 | 0.0024 | 0.0023 | 0.0028 | 0.0029 | 0.0034 |
| | 2022 | 0.0025 | 0.0028 | 0.0025 | 0.0027 | 0.0026 | 0.0027 | 0.0034 | 0.0031 | 0.0029 | 0.0033 | 0.0032 | 0.0035 |
| | 2023 | 0.0030 | 0.0039 | 0.0039 | 0.0034 | 0.0039 | 0.0034 | 0.0037 | 0.0035 | 0.0034 | 0.0035 | 0.0036 | 0.0039 |
| | **2024** | **0.0037** | **0.0040** | **0.0055** | **0.0029** | **0.0025** | **0.0030** | **0.0036** | **0.0025** | **0.0034** | **0.0031** | **0.0031** | **0.0038** |
| Sandakan | 2020 | 0.0042 | 0.0033 | 0.0027 | 0.0016 | 0.0028 | 0.0041 | 0.0041 | 0.0041 | 0.0045 | 0.0034 | 0.0036 | 0.0041 |
| | 2021 | 0.0036 | 0.0027 | 0.0041 | 0.0041 | 0.0032 | 0.0025 | 0.0035 | 0.0030 | 0.0033 | 0.0043 | 0.0047 | 0.0046 |
| | 2022 | 0.0049 | 0.0035 | 0.0040 | 0.0042 | 0.0042 | 0.0036 | 0.0039 | 0.0044 | 0.0045 | 0.0048 | 0.0051 | 0.0053 |
| | 2023 | 0.0043 | 0.0036 | 0.0033 | 0.0040 | 0.0045 | 0.0047 | 0.0041 | 0.0046 | 0.0049 | 0.0042 | 0.0049 | 0.0044 |
| | **2024** | **0.0039** | **0.0035** | **0.0039** | **0.0039** | **0.0039** | **0.0053** | **0.0050** | **0.0047** | **0.0046** | **0.0051** | **0.0050** | **0.0043** |
| Tawau | 2020 | 0.0055 | 0.0057 | 0.0037 | 0.0026 | 0.0036 | 0.0046 | 0.0046 | 0.0050 | 0.0041 | 0.0035 | 0.0043 | 0.0049 |
| | 2021 | 0.0047 | 0.0046 | 0.0055 | 0.0051 | 0.0047 | 0.0039 | 0.0042 | 0.0039 | 0.0042 | 0.0047 | 0.0048 | 0.0057 |
| | 2022 | 0.0059 | 0.0046 | 0.0045 | 0.0051 | 0.0054 | 0.0045 | 0.0050 | 0.0050 | 0.0054 | 0.0049 | 0.0060 | 0.0053 |
| | 2023 | 0.0056 | 0.0050 | 0.0053 | 0.0056 | 0.0054 | 0.0051 | 0.0054 | 0.0052 | 0.0058 | 0.0058 | 0.0058 | 0.0057 |
| | **2024** | **0.0059** | **0.0054** | **0.0058** | **0.0052** | **0.0043** | **0.0048** | **0.0052** | **0.0048** | **0.0057** | **0.0049** | **0.0050** | **0.0044** |

**Nota: Garis Panduan Kualiti Udara Malaysia: $NO_2$ tidak melebihi 0.16 ppm**
*Notes: Malaysian Ambient Air Quality Guidelines: $NO_2$ not exceeding 0.16 ppm*

**Sumber: Jabatan Alam Sekitar**
*Source: Department of Environment*

**Jadual 1.26: Status kualiti air marin di kawasan pantai, muara sungai dan pulau berdasarkan Indeks Kualiti Air Marin, Sabah, 2020-2024**

*Table 1.26: Status of marine water quality in coastal, estuary and island areas based on Marine Water Quality Index, Sabah, 2020-2024*

Bilangan stesen
*Number of stations*

| Kawasan *Area* | Kategori *Category* | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2020 | | | | 2021 | | | | 2022 | | | | 2023 | | | | **2024** | | | |
| | **E** | **G** | **M** | **P** | **E** | **G** | **M** | **P** | **E** | **G** | **M** | **P** | **E** | **G** | **M** | **P** | **E** | **G** | **M** | **P** |
| Pantai *Coastal* | - | - | 24 | - | - | 3 | 21 | - | - | 2 | 22 | - | - | - | 24 | - | **-** | **3** | **21** | **-** |
| Muara *Estuary* | - | - | 2 | - | - | - | 2 | - | - | - | 2 | - | - | - | 2 | - | **-** | **-** | **2** | **-** |
| Pulau *Island* | - | - | 17 | - | - | 2 | 15 | - | - | 7 | 10 | - | - | - | 17 | - | **-** | **-** | **17** | **-** |

**Nota/** *Notes:*

**Klasifikasi Indeks Kualiti Air Marin:**
*Marine Water Quality Index Classification:*

| **Kategori** *Category* | **Nilai indeks** *Index value* |
|---|---|
| **E** | Terbaik/ *Excellent* (90 -100) |
| **G** | Baik/ *Good* (80 - <90) |
| **M** | Sederhana/ *Moderate* (50 - <80) |
| **P** | Tercemar/ *Poor* (0 - <50) |

**Sumber: Jabatan Alam Sekitar**
*Source: Department of Environment*

**Jadual 2.1: Rizab minyak mentah dan kondensat, Sabah, 2019-2023**

*Table 2.1: Reserves of crude oil and condensates, Sabah, 2019-2023*

Bilion tong
*Billion barrels*

| Tahun *Year* | 2019 | 2020 | 2021 | 2022 | **2023[p]** |
|---|---|---|---|---|---|
| Rizab *Reserves* | 1.497 | 1.451 | 1.342 | 1.276 | **1.241** |

**Sumber: Suruhanjaya Tenaga**
*Source: Energy Commission*

**Jadual 2.2: Rizab gas asli, Sabah, 2019-2023**

*Table 2.2: Reserves of natural gas, Sabah, 2019-2023*

Trilion Kubik Kaki Standard (TSCF)

| Jenis *Type* | 2019 | 2020 | 2021 | 2022 | **2023[p]** |
|---|---|---|---|---|---|
| Jumlah *Total* | 11.665 | 10.55 | 9.675 | 10.125 | **10.963** |
| Bersekutu *Associated* | 2.054 | 1.605 | 1.518 | 1.721 | **1.803** |
| Tidak bersekutu *Non-associated* | 9.611 | 8.945 | 8.157 | 8.405 | **9.16** |

**Sumber: Suruhanjaya Tenaga**
*Source: Energy Commission*

**Jadual 2.3: Keluasan hutan yang dilesenkan untuk pengusahasilan, Sabah, 2019-2023**

*Table 2.3: Forest area licensed for harvesting, Sabah, 2019-2023*

Hektar

| Tahun *Year* | 2019 | 2020 | 2021 | 2022 | **2023** |
|---|---|---|---|---|---|
| Keluasan *Area* | 6,381 | 18,997 | 38,908 | 49,984 | **24,508** |

**Sumber: Jabatan Perhutanan Sabah**
*Source: Sabah Forestry Department*

**Jadual 2.4: Pengeluaran produk kayu-kayan utama, Sabah 2019-2023**

*Table 2.4: Production of major timber products, Sabah, 2019-2023*

Meter padu
*Cubic metres*

| Tahun *Year* | Kayu balak[1] *Logs* | Kayu gergaji *Sawn timber* | Papan lapis *Plywood* | Venir *Veneer* | Kayu kumai *Moulding* |
|---|---|---|---|---|---|
| 2019 | 1,074,922 | 238,671 | 423,981 | 59,082 | 27,705 |
| 2020 | 680,800 | 156,263 | 277,435 | 31,366 | 16,521 |
| 2021 | 1,128,116 | 191,373 | 375,558 | 50,879 | 28,437 |
| 2022 | 1,021,434 | 209,756 | 344,687 | 85,088 | 31,346 |
| **2023** | **816,287** | **217,977** | **253,997** | **54,980** | **26,748** |

**Sumber: Jabatan Perhutanan Sabah**
*Source: Sabah Forestry Department*

**Nota: [1] Tidak termasuk pengeluaran kayu getah, kayu jaras, batang kelapa dan batang kelapa sawit**
*Notes: Exclude production of hevea logs, poles, coconut trunks and oil palm trunks*

**Data merujuk kepada syarikat yang berdaftar dengan Jabatan Perhutanan Sabah sahaja**
*Data refers to establishment registered with Sabah Forestry Department only*

**Jadual 2.5: Pendaratan ikan laut, Sabah, 2020-2024**

*Table 2.5: Landings of marine fish, Sabah, 2020-2024*

Tan metrik ('000)
*Metric tonnes*

| Negeri *State* | 2020 | | 2021 | | 2022 | | 2023 | | **2024** | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Kuantiti *Quantity* | % | Kuantiti *Quantity* | % | Kuantiti *Quantity* | % | Kuantiti *Quantity* | % | Kuantiti *Quantity* | % |
| **Malaysia** | **1,383.3** | **100.0** | **1,328.0** | **100.0** | **1,308.4** | **100.0** | **1,270.3** | **100.0** | **1,392.1** | **100.0** |
| Sabah | 206.7 | 14.9 | 216.3 | 16.3 | 230.2 | 17.6 | 212.8 | 16.8 | **201.8** | **14.5** |

**Sumber: Jabatan Perikanan Malaysia**
*Source: Department of Fisheries Malaysia*

**Jadual 2.6: Bilangan ternakan, Sabah, 2020-2024**

*Table 2.6: Number of livestock, Sabah, 2020-2024*

Bilangan
*Number*

| Negeri *State* | Tahun *Year* | Jenis ternakan *Type of livestock* | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Kerbau *Buffalo* | Lembu *Cattle* | Kambing *Goat* | Bebiri *Sheep* | Babi *Swine* | Ayam *Chicken* | Itik *Duck* |
| Sabah | 2020 | 12,000 | 50,137 | 35,000 | 1,334 | 92,500 | 6,600,000 | 50,500 |
| | 2021 | 10,139 | 52,928 | 24,681 | 1,334 | 89,469 | 6,640,295 | 40,588 |
| | 2022 | 12,855 | 47,380 | 28,252 | 1,931 | 86,510 | 9,643,735 | 53,981 |
| | 2023 | 13,271 | 48,801 | 29,099 | 1,988 | 89,105 | 9,095,891 | 55,600 |
| | **2024** | **12,506** | **49,394** | **29,229** | **1,968** | **88,682** | **9,294,445** | **54,265** |

**Sumber: Jabatan Perkhidmatan Veterinar**
*Source: Department of Veterinary Services*

**Jadual 2.7: Sembelihan ternakan yang direkod, Sabah, 2019-2023**

*Table 2.7: Recorded slaughter of livestock, Sabah, 2019-2023*

Bilangan
*Number*

| Jenis ternakan *Type of livestock* | 2019 | 2020 | 2021 | 2022 | **2023** |
|---|---|---|---|---|---|
| Kerbau *Buffalo* | 503 | 96 | 189 | 169 | **621** |
| Lembu *Cattle* | 1,232 | 3,700 | 1,039 | 1,093 | **2,079** |
| Kambing *Goat* | 1,281 | 744 | 75 | 92 | **124** |
| Bebiri *Sheep* | - | - | - | - | **-** |
| Babi *Swine* | 122,631 | 114,003 | 110,687 | 97,641 | **64,735** |

**Sumber: Jabatan Perkhidmatan Veterinar**
*Source: Department of Veterinary Services*

**Jadual 2.8: Rekabentuk kapasiti loji rawatan air, Sabah, 2020-2024**

*Table 2.8: Water treatment plants design capacity, Sabah, 2020-2024*

Juta liter sehari (JLH)
*Million litres per day (MLD)*

| Negeri *State* | 2020 | 2021 | 2022 | 2023 | **2024** |
|---|---|---|---|---|---|
| Sabah | 1,487 | 1,505 | 1,511 | 1,533 | **1,630** |

**Nota/** *Notes:*

**Peningkatan rekabentuk kapasiti loji rawatan air adalah kerana terdapat penambahan loji baru dan pembesaran rekabentuk loji yang sedia ada. Pengurangan rekabentuk kapasiti loji rawatan air pula disebabkan oleh penutupan loji secara terus dan penutupan sementara loji rawatan air (akan dibuka semula apabila diperlukan)**

*The increase of water treatment plants design capacity is due to the addition of new plant and expansion of present plant design. The decrease of water treatment plants design capacity is due to the closing of plants and temporary closure of water treatment plant (will be reopened when needed)*

**Jadual 2.9: Pengeluaran air yang dibekalkan, Sabah, 2020-2024**

*Table 2.9: Production of water supplied, Sabah, 2020-2024*

Juta liter sehari (JLH)
*Million litres per day (MLD)*

| Negeri *State* | 2020 | 2021 | 2022 | 2023 | **2024** |
|---|---|---|---|---|---|
| Sabah | 1,319 | 1,365 | 1,404 | 1,407 | **1,436** |

**Jadual 2.10: Bekalan air mentah diabstrak dari sungai dan empangan, Sabah, 2020-2024**

*Table 2.10: Supply of abstracted raw water from rivers and storage dams, Sabah, 2020-2024*

Juta liter sehari (JLH)
*Million litres per day (MLD)*

| Tahun *Year* | 2020 | 2021 | 2022 | 2023 | **2024** |
|---|---|---|---|---|---|
| Sungai *Rivers* | 968 | 1,335 | 1,124 | 1,060 | **1,109** |
| Empangan *Dams* | 387 | 130 | 297 | 419 | **371** |
| Air bawah tanah *Groundwater* | 23[r] | 7 | 15 | 8 | **5.1** |

**Jadual 2.11: Penggunaan air bermeter mengikut sektor, Sabah, 2020-2024**

*Table 2.11: Metered water consumption by sector, Sabah, 2020-2024*

Juta liter sehari (JLH)
*Million litres per day (MLD)*

| Negeri *State* | Sektor *Sector* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Domestik *Domestic* | | | | | Bukan domestik *Non-domestic* | | | | |
| | 2020 | 2021 | 2022 | 2023 | **2024** | 2020 | 2021 | 2022 | 2023 | **2024** |
| Sabah | 313 | 425 | 394 | 416 | **667** | 224 | 225 | 238 | 229 | **145** |

**Sumber: Kementerian Peralihan Tenaga dan Transformasi Air, Suruhanjaya Perkhidmatan Air Negara**

*Source: Ministry of Energy Transition and Water Transformation National Water Services Commission*

**Jadual 3.1: Senarai dan kapasiti kemudahan rawatan dan pelupusan sisa perbandaran, Sabah, 2024**

*Table 3.1: List and capacity of municipal waste treatment and disposal facilities, Sabah, 2024*

| Tapak pelupusan *Disposal site* | | | Loji rawatan termal *Thermal treatment plant* | | |
|---|---|---|---|---|---|
| Nama tapak *Site name* | Kapasiti muatan sisa sehari (tan/ hari) *Residual load capacity daily (tonnes/day)* | Luas (Hektar) *Area (Hectares)* | Nama loji *Plant name* | Kapasiti muatan sisa sehari (tan/ hari) *Residual load capacity daily (tonnes/day)* | Luas (Hektar) *Area (Hectares)* |
| TP Lumat | 35.0 | 4.1 | - | - | - |
| TP Kg Kolapis | 10.0 | 6.1 | - | - | - |
| TP Telupid | 15.0 | 6.0 | - | - | - |
| TP Jln. Sedukut | 40.0 | 30.0 | - | - | - |
| TP Jln. Sinar Jaya | 10.0 | 6.1 | - | - | - |
| TPS Kayu Madang | 400.0 | 46.5 | - | - | - |
| TP Kota Marudu | 1.6 | n/a | - | - | - |
| TP Menumpang | 10.0 | 10.0 | - | - | - |
| TP Menumbok | 6.0 | 1.0 | - | - | - |
| TP Kunak | 6.0 | 5.0 | - | - | - |
| TP Lahad Datu | 213.0 | 20.2 | - | - | - |
| TP LBK | 110.0 | 2.0 | - | - | - |
| TP Kg. Langkawit | 20.0 | 4.1 | - | - | - |
| TP Ranau | 40.0 | 6.1 | - | - | - |
| TP Labuk | 220.0 | 101.1 | - | - | - |
| TP Kg. Simunul | 20.0 | 0.8 | - | - | - |
| TP Sipitang | 20.0 | 0.8 | - | - | - |
| TP Jln. Mosogit | 8.0 | 4.1 | - | - | - |
| TP Mengkadait | 25.0 | 4.1 | - | - | - |
| TP Bukit Gemok | 177.0 | 3.3 | - | - | - |
| TP Kg. Amboi | 25.0 | 4.1 | - | - | - |
| TP Tamu | n/a | n/a | - | - | - |

**Nota/** *Notes:*
**TP: Tapak pelupusan bukan sanitari/** *Non-sanitary landfil*
**TPS: Tapak pelupusan sanitari/** *Sanitary landfill*
**TPi: Tapak pelupusan lengai/** *Inert landfill*
**LRT: Loji Rawatan Termal/** *Thermal treatment plant (Incinerator)*

**Sumber: Kementerian Perumahan Kerajaan Tempatan**
*Source: Ministry of Housing and Local Government*

**Jadual 3.2: Bilangan kemudahan rawatan dan pelupusan sisa perbandaran, Sabah, 2024**

*Table 3.2: Number of municipal waste treatment and disposal facilities, Sabah, 2024*

| Tapak pelupusan di bawah seliaan SWCorp *Disposal site under SWCorp* | Tapak pelupusan bukan di bawah seliaan SWCorp *Disposal site not under SWCorp* |
|---|---|
| - | 22 |

**Sumber: Kementerian Perumahan Kerajaan Tempatan**
*Source: Ministry of Housing and Local Government*

**Jadual 3.3: Buangan terjadual, Sabah, 2020-2024**

*Table 3.3 Scheduled wastes, Sabah, 2020-2024*

Tan metrik
*Metric tonnes*

| Tahun *Year* | 2020 | 2021 | 2022 | 2023 | **2024** |
|---|---|---|---|---|---|
| Kuantiti *Quantity* | 460,171 | 74,834 | 40,534 | 44,970 | **74,392** |

**Sumber: Jabatan Alam Sekitar**
*Source: Department of Environment*

**Jadual 3.4: Kuantiti buangan klinikal, Sabah, 2020-2024**

*Table 3.4: Quantity of clinical waste, Sabah, 2020-2024*

Tan metrik
*Metric tonnes*

| Tahun *Year* | 2020 | 2021 | 2022 | 2023 | **2024** |
|---|---|---|---|---|---|
| Kuantiti *Quantity* | 2,606.0 | 3,209.9 | 3,268.6 | 2,978.0 | **2,681.0** |

**Sumber: Jabatan Alam Sekitar**
*Source: Department of Environment*

**Jadual 3.5: Bilangan tapak pelupusan sisa pepejal yang beroperasi, Sabah, 2020-2024**

*Table 3.5: Number of operating solid waste landfills, Sabah, 2020-2024*

| Tahun *Year* | Sanitari *Sanitary* | Bukan sanitari *Non sanitary* | Lengai *Inert* |
|---|---|---|---|
| 2020 | 1 | 21 | - |
| 2021 | 1 | 21 | - |
| 2022 | 1 | 21 | - |
| 2023 | 1 | 21 | - |
| **2024** | 1 | 21 | - |

**Sumber: Kementerian Perumahan Kerajaan Tempatan**
*Source: Ministry of Housing and Local Government*

**Jadual 4.1: Kejadian bencana, Sabah, 2020-2024**

*Table 4.1: Disaster events, Sabah, 2020-2024*

| Tahun *Year* | Bilangan kejadian *Number of events* | Mangsa *Victim* | Keluarga *Family* | Pusat pemindahan *Evacuation center* | Kematian *Death* | Rumah rosak *House damaged* |
|---|---|---|---|---|---|---|
| 2020 | 2 | 1,363 | 423 | 16 | - | **-** |
| 2021 | 6 | 9,926 | 3,088 | 74 | 2 | **-** |
| 2022 | 23 | 10,742 | 3,231 | 95 | - | - |
| 2023 | 18 | 13,946 | 4,783 | 76 | - | - |
| **2024** | **15** | **1,816** | **518** | **17** | **1** | **-** |

**Sumber: Agensi Pengurusan Bencana Negara**

*Source: National Disaster Management Agency*

**Nota: Bilangan kejadian bencana adalah berdasarkan keluarga dan mangsa yang dengan bencana dan telah ditempatkan di Pusat Pemindahan Sementara (PPS)**

*Notes: Number of disaster events is based on families and victims affected by disaster and placed at the Temporary Evacuation Centers (PPS)*

**Jadual 4.2: Bilangan kejadian banjir yang dilaporkan, Sabah, 2020-2024**

*Table 4.2: Number of flood incidents reported, Sabah, 2020-2024*

| Tahun *Year* | 2020 | 2021 | 2022 | 2023 | **2024** |
|---|---|---|---|---|---|
| Bilangan *Number* | 44 | 85 | 63 | 58 | **49** |

**Sumber: Jabatan Pengairan dan Saliran**

*Source: Department of Irrigation and Drainage*

**Jadual 4.3: Bilangan kejadian gempa bumi, Sabah, 2020-2024**

*Table 4.3: Number of earthquake incidents, Sabah, 2020-2024*

| Lokasi *Location* | Tahun *Year* | Jan. | Feb. | Mac *Mar.* | Apr. | Mei *May* | Jun *June* | Julai *July* | Ogos *Aug.* | Sept. | Okt. *Oct.* | Nov. | Dis. *Dec.* | Jumlah *Total* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Malaysia** | 2020 | 11 | 4 | 9 | 6 | 1 | 1 | 1 | 5 | 7 | 7 | 3 | 1 | 56 |
| | M | 1.1 - 3.6 | | | | | | | | | | | | |
| | 2021 | 7 | 3 | 4 | 14 | - | 1 | - | - | 2 | - | 4 | 5 | 40 |
| | M | 1.0 - 3.4 | | | | | | | | | | | | |
| | 2022 | 7 | 13 | 14 | 15 | 7 | 10 | 5 | 7 | 3 | - | 1 | - | 82 |
| | M | 0.9 - 3.5 | | | | | | | | | | | | |
| | 2023 | 1 | 1 | 1 | 1 | 1 | 1 | - | 7 | 3 | 1 | 1 | 3 | 21 |
| | M | 1.2 - 5.7 | | | | | | | | | | | | |
| | 2024 | 3 | 3 | 2 | 5 | 1 | 1 | 3 | 2 | - | 3 | 1 | 4 | 28 |
| | M | 1.2 - 3.6 | | | | | | | | | | | | |

**Jadual 4.3: Bilangan kejadian gempa bumi, Sabah, 2020-2024 (samb.)**

*Table 4.3: Number of earthquake incidents, Sabah, 2020-2024 (cont'd)*

| Lokasi *Location* | Tahun *Year* | Jan. | Feb. | Mac *Mar.* | Apr. | Mei *May* | Jun *June* | Julai *July* | Ogos *Aug.* | Sept. | Okt. *Oct.* | Nov. | Dis. *Dec.* | Jumlah *Total* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Beluran | 2020 | - | - | - | - | - | - | - | - | 2 | - | - | - | 1 |
| | M | | | | | | 2.5 - 3.2 | | | | | | | |
| | 2021 | 1 | - | - | 1 | - | - | - | - | - | - | - | - | 2 |
| | M | | | | | | 2.6 - 2.8 | | | | | | | |
| | 2022 | - | - | 1 | - | - | - | - | - | - | - | - | - | 1 |
| | M | | | | | | 3.3 | | | | | | | |
| | 2023 | - | - | - | - | - | - | - | - | - | - | - | 1 | 1 |
| | M | | | | | | 2.7 | | | | | | | |
| | 2024 | - | 1 | - | 1 | - | - | - | - | - | - | - | - | 2 |
| | M | | | | | | 2.2 - 2.3 | | | | | | | |
| Keningau | 2020 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| | 2021 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| | 2022 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| | 2023 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| | 2024 | - | - | - | - | - | - | - | - | - | 1 | | | |
| | M | | | | | | | 2.6 | | | | | | |
| Kinabatangan | 2020 | - | - | - | - | - | - | - | - | 1 | - | - | - | 1 |
| | M | | | | | | | 2.4 | | | | | | |
| | 2021 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| | 2022 | - | - | - | - | - | - | - | - | 1 | - | - | - | 1 |
| | M | | | | | | | 2.5 | | | | | | |
| | 2023 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| | 2024 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| Kinabalu Park, Ranau | 2020 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| | 2021 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| | 2022 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| | 2023 | - | - | - | - | - | - | - | 1 | - | - | - | - | 1 |
| | M | | | | | | | 3.7 | | | | | | |
| | 2024 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |

**Jadual 4.3: Bilangan kejadian gempa bumi, Sabah, 2020-2024 (samb.)**

*Table 4.3: Number of earthquake incidents, Sabah, 2020-2024 (cont'd)*

| Lokasi *Location* | Tahun *Year* | Jan. | Feb. | Mac *Mar.* | Apr. | Mei *May* | Jun *June* | Julai *July* | Ogos *Aug.* | Sept. | Okt. *Oct.* | Nov. | Dis. *Dec.* | Jumlah *Total* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kota Belud | 2020 | - | - | - | - | - | - | - | - | 1 | - | - | - | 1 |
| | M | | | | | | | 2.3 | | | | | | |
| | 2021 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| | 2022 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| | 2023 | - | - | - | - | - | - | - | 1 | - | - | - | - | 1 |
| | M | | | | | | | 1.9 | | | | | | |
| | 2024 | - | - | - | 1 | - | - | 1 | - | - | - | - | - | 2 |
| | M | | | | | | | 1.3 - 2.0 | | | | | | |
| Kota Kinabalu | 2020 | 1 | - | - | - | - | - | - | - | - | - | - | - | 1 |
| | M | | | | | | | 1.9 | | | | | | |
| | 2021 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| | 2022 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| | 2023 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| | 2024 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| Kota Marudu | 2020 | - | - | 1 | - | - | - | - | - | - | - | - | - | 1 |
| | M | | | | | | | 2.1 | | | | | | |
| | 2021 | - | - | - | 1 | - | - | - | - | - | - | - | - | 1 |
| | M | | | | | | | 1.5 | | | | | | |
| | 2022 | - | - | - | - | 1 | 1 | - | - | - | - | - | - | 2 |
| | M | | | | | | | 1.9 - 2.1 | | | | | | |
| | 2023 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| | 2024 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| Kudat | 2020 | - | - | 1 | - | - | 1 | - | - | 1 | - | - | - | 3 |
| | M | | | | | | | 2.2 - 3.6 | | | | | | |
| | 2021 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| | 2022 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| | 2023 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| | 2024 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |

**Jadual 4.3: Bilangan kejadian gempa bumi, Sabah, 2020-2024 (samb.)**

*Table 4.3: Number of earthquake incidents, Sabah, 2020-2024 (cont'd)*

| Lokasi *Location* | Tahun *Year* | Jan. | Feb. | Mac *Mar.* | Apr. | Mei *May* | Jun *June* | Julai *July* | Ogos *Aug.* | Sept. | Okt. *Oct.* | Nov. | Dis. *Dec.* | Jumlah *Total* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kunak | 2020 | - | 2 | - | 5 | - | - | - | - | - | - | 1 | - | 8 |
| | M | | | | | | 2.1 - 3.6 | | | | | | | |
| | 2021 | - | - | - | - | - | 1 | - | - | - | - | - | - | 1 |
| | M | | | | | | 2.8 | | | | | | | |
| | 2022 | - | 1 | - | - | - | - | - | - | - | - | - | - | 1 |
| | M | | | | | | 2.2 | | | | | | | |
| | 2023 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | - | | | | | | | |
| | 2024 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | - | | | | | | | |
| Kundasang | 2020 | 2 | - | 3 | - | - | - | - | 2 | 1 | 4 | 1 | - | 13 |
| | M | | | | | | 1.4 - 2.9 | | | | | | | |
| | 2021 | 2 | 2 | 3 | 8 | - | - | - | - | 1 | - | 3 | 2 | 21 |
| | M | | | | | | 1.0 - 3.4 | | | | | | | |
| | 2022 | 3 | 11 | 8 | 8 | 5 | 5 | 5 | 4 | 2 | - | 1 | - | 52 |
| | M | | | | | | 0.9 - 3.5 | | | | | | | |
| | 2023 | - | - | - | - | - | - | - | 2 | - | - | - | - | 2 |
| | M | | | | | | 1.2 - 2.1 | | | | | | | |
| | 2024 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | - | | | | | | | |
| Lahad Datu | 2020 | - | - | 1 | - | 1 | - | 1 | 2 | 1 | - | - | - | 6 |
| | M | | | | | | 2.0 - 3.3 | | | | | | | |
| | 2021 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | - | | | | | | | |
| | 2022 | - | - | - | 1 | - | - | - | - | - | - | - | - | 1 |
| | M | | | | | | 2.8 | | | | | | | |
| | 2023 | - | - | - | - | - | - | - | - | 1 | - | - | - | 1 |
| | M | | | | | | 2.4 | | | | | | | |
| | 2024 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | - | | | | | | | |
| Nabawan | 2020 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | - | | | | | | | |
| | 2021 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | - | | | | | | | |
| | 2022 | - | - | 1 | - | - | - | - | - | - | - | - | - | 1 |
| | M | | | | | | 2.5 | | | | | | | |
| | 2023 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | - | | | | | | | |
| | 2024 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | - | | | | | | | |

**Jadual 4.3: Bilangan kejadian gempa bumi, Sabah, 2020-2024 (samb.)**

*Table 4.3: Number of earthquake incidents, Sabah, 2020-2024 (cont'd)*

| Lokasi *Location* | Tahun *Year* | Jan. | Feb. | Mac *Mar.* | Apr. | Mei *May* | Jun *June* | Julai *July* | Ogos *Aug.* | Sept. | Okt. *Oct.* | Nov. | Dis. *Dec.* | Jumlah *Total* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Perairan Kunak | 2020 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| | 2021 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| | 2022 | - | - | - | - | - | 1 | - | - | - | - | - | - | 1 |
| | M | | | | | | | 2.2 | | | | | | |
| | 2023 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| | 2024 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| Perairan Sabah Timur, Sabah | 2020 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| | 2021 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| | 2022 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| | 2023 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| | 2024 | 1 | - | - | - | - | - | - | - | - | - | - | - | 1 |
| | M | | | | | | | 3.6 | | | | | | |
| Perairan Tawau, Sabah | 2020 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| | 2021 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| | 2022 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| | 2023 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| | 2024 | - | - | - | - | - | - | - | 1 | - | - | - | - | 1 |
| | M | | | | | | | 3.9 | | | | | | |
| Pitas | 2020 | - | - | 1 | - | - | - | - | - | - | - | - | - | 1 |
| | M | | | | | | | 2.6 | | | | | | |
| | 2021 | - | - | - | 1 | - | - | - | - | - | - | - | - | 1 |
| | M | | | | | | | 2.6 | | | | | | |
| | 2022 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| | 2023 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |
| | 2024 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | | - | | | | | | |

**Jadual 4.3: Bilangan kejadian gempa bumi, Sabah, 2020-2024 (samb.)**

*Table 4.3: Number of earthquake incidents, Sabah, 2020-2024 (cont'd)*

| Lokasi *Location* | Tahun *Year* | Jan. | Feb. | Mac *Mar.* | Apr. | Mei *May* | Jun *June* | Julai *July* | Ogos *Aug.* | Sept. | Okt. *Oct.* | Nov. | Dis. *Dec.* | Jumlah *Total* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ranau | 2020 | 8 | 2 | - | - | - | - | - | - | - | 2 | - | - | 12 |
| | M | | | | | | 1.1 - 2.9 | | | | | | | |
| | 2021 | 1 | 1 | - | 3 | - | - | - | - | - | - | 1 | 1 | 7 |
| | M | | | | | | 1.7 - 2.9 | | | | | | | |
| | 2022 | 3 | - | 4 | 5 | - | 2 | - | 2 | - | - | - | - | 16 |
| | M | | | | | | 0.9 - 2.5 | | | | | | | |
| | 2023 | 1 | - | - | - | - | - | - | 3 | 2 | - | - | 1 | 6 |
| | M | | | | | | 1.3 - 2.5 | | | | | | | |
| | 2024 | 2 | 2 | 1 | 2 | 1 | - | 2 | - | - | 2 | 1 | 2 | 15 |
| | M | | | | | | 1.1 - 3.1 | | | | | | | |
| Sabah Coastal Area, Sabah | 2020 | - | - | 1 | - | - | - | - | - | - | - | - | 1 | 2 |
| | M | | | | | | 2.7 | | | | | | | |
| | 2021 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | - | | | | | | | |
| | 2022 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | - | | | | | | | |
| | 2023 | - | - | - | - | - | - | - | - | - | 1 | - | - | 1 |
| | M | | | | | | 2.4 | | | | | | | |
| | 2024 | - | - | - | - | - | 1 | - | - | - | - | - | - | 1 |
| | M | | | | | | 3.3 | | | | | | | |
| Sandakan | 2020 | - | - | 1 | - | - | - | - | - | - | - | - | 1 | 2 |
| | M | | | | | | 2.7 | | | | | | | |
| | 2021 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | - | | | | | | | |
| | 2022 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | - | | | | | | | |
| | 2023 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | - | | | | | | | |
| | 2024 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | - | | | | | | | |
| Sapulut | 2020 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | - | | | | | | | |
| | 2021 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | - | | | | | | | |
| | 2022 | - | - | - | - | - | - | - | 1 | - | - | - | - | 1 |
| | M | | | | | | 2.9 | | | | | | | |
| | 2023 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | - | | | | | | | |
| | 2024 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | - | | | | | | | |

**Jadual 4.3: Bilangan kejadian gempa bumi, Sabah, 2020-2024 (samb.)**

*Table 4.3: Number of earthquake incidents, Sabah, 2020-2024 (cont'd)*

| Lokasi *Location* | Tahun *Year* | Jan. | Feb. | Mac *Mar.* | Apr. | Mei *May* | Jun *June* | Julai *July* | Ogos *Aug.* | Sept. | Okt. *Oct.* | Nov. | Dis. *Dec.* | Jumlah *Total* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Semporna | 2020 | - | - | - | 1 | - | - | - | 1 | - | - | - | - | 2 |
| | M | | | | | | 2.8 - 3.5 | | | | | | | |
| | 2021 | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 2 |
| | M | | | | | | 2.9 - 3.2 | | | | | | | |
| | 2022 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | - | | | | | | | |
| | 2023 | - | - | - | - | - | 1 | - | - | - | - | - | - | 1 |
| | M | | | | | | 2.6 | | | | | | | |
| | 2024 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | - | | | | | | | |
| Silam | 2020 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | - | | | | | | | |
| | 2021 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | - | | | | | | | |
| | 2022 | - | - | - | 1 | - | - | - | - | - | - | - | - | 1 |
| | M | | | | | | 2.4 | | | | | | | |
| | 2023 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | - | | | | | | | |
| | 2024 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | - | | | | | | | |
| Tambunan | 2020 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | - | | | | | | | |
| | 2021 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | - | | | | | | | |
| | 2022 | - | 1 | - | - | 1 | - | - | - | - | - | - | - | 2 |
| | M | | | | | | 1.8 - 2.2 | | | | | | | |
| | 2023 | - | - | - | - | 1 | - | - | - | - | - | - | - | 1 |
| | M | | | | | | 1.5 | | | | | | | |
| | 2024 | - | - | 1 | - | - | - | - | - | - | - | - | - | 1 |
| | M | | | | | | 1.6 | | | | | | | |
| Tawau | 2020 | - | - | 1 | - | - | - | - | - | - | 1 | - | - | 2 |
| | M | | | | | | 2.0 - 2.4 | | | | | | | |
| | 2021 | - | - | - | - | - | - | - | - | - | - | - | 2 | 2 |
| | M | | | | | | 1.8 - 2.0 | | | | | | | |
| | 2022 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | M | | | | | | - | | | | | | | |
| | 2023 | - | - | 1 | - | - | - | - | - | - | - | 1 | - | 2 |
| | M | | | | | | 2.3 - 2.4 | | | | | | | |
| | 2024 | - | - | - | 1 | - | - | - | - | - | - | - | 1 | 2 |
| | M | | | | | | 2.7 | | | | | | | |

**Jadual 4.3: Bilangan kejadian gempa bumi, Sabah, 2020-2024 (samb.)**

*Table 4.3: Number of earthquake incidents, Sabah, 2020-2024 (cont'd)*

| Lokasi *Location* | Tahun *Year* | Jan. | Feb. | Mac *Mar.* | Apr. | Mei *May* | Jun *June* | Julai *July* | Ogos *Aug.* | Sept. | Okt. *Oct.* | Nov. | Dis. *Dec.* | Jumlah *Total* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tongod | 2020 | - | - | - | - | - | - | - | - | - | - | 1 | - | 1 |
| | M | | | | | | 2.8 | | | | | | | |
| | 2021 | 2 | - | 1 | - | - | - | - | - | - | - | - | - | 3 |
| | M | | | | | | 2.0 - 2.8 | | | | | | | |
| | 2022 | 1 | - | - | - | - | 1 | - | - | - | - | - | - | 2 |
| | M | | | | | | 1.4 - 2.2 | | | | | | | |
| | 2023 | - | 1 | - | - | - | - | - | - | - | - | - | 1 | 2 |
| | M | | | | | | 2.5 - 2.6 | | | | | | | |
| | 2024 | - | - | - | - | - | - | - | 1 | - | - | - | 1 | 2 |
| | M | | | | | | 2.4 - 2.7 | | | | | | | |

**Nota: M: Magnitud**
*Note: M: Magnitude*

**Sumber: Jabatan Meteorologi Malaysia**
*Source: Malaysia Meteorological Department*

**Jadual 4.4: Bilangan kemalangan jalan raya dan kecederaan yang dilaporkan, Sabah, 2020-2024**

*Table 4.4: Number of road accidents and casualties reported, Sabah, 2020-2024*

| Tahun *Year* | Kemalangan jalan raya *Road accidents* | Kecederaan *Casualties* | | |
|---|---|---|---|---|
| | | Kecederaan[1] *Injury* | Kematian *Death* | Jumlah *Total* |
| 2020 | 12,498 | 368 | 214 | 582 |
| 2021 | 12,563 | 365 | 213 | 578 |
| 2022 | 17,623 | 569 | 269 | 838 |
| 2023 | 19,053 | 377 | 248 | 625 |
| **2024** | **20,224** | **666** | **319** | **985** |

**Sumber: Jabatan Siasatan dan Penguatkuasaan Trafik, Polis Diraja Malaysia**
*Source: Investigation and Enforcement of the Traffic Department, Royal Malaysian Police*

**Nota: [1]Kecederaan merujuk kepada kecederaan ringan dan parah**
*Notes: Injury refer to minor and serious injuries*

**Jadual 4.5: Bilangan kejadian kebakaran, Sabah, 2020-2024**

*Table 4.5: Number of fire incidents, Sabah, 2020-2024*

| Tahun *Year* | 2020 | 2021 | 2022 | 2023 | **2024** |
|---|---|---|---|---|---|
| Bilangan *Number* | 2,927 | 1,655 | 1,461 | 2,474 | **3,649** |

**Sumber: Kementerian Perumahan Kerajaan Tempatan**
*Source: Ministry of Housing and Local Government*

**Jadual 4.6: Bilangan kematian, kecederaan dan anggaran kerugian akibat kebakaran yang dilaporkan, Sabah, 2020-2024**

*Table 4.6: Number of deaths, injuries and estimated losses caused by fire reported, Sabah, 2020-2024*

| Tahun *Year* | Kematian *Death* | Kecederaan *Injury* | Kerugian (RM juta) *Loss (Millions)* |
|---|---|---|---|
| 2020 | 17 | 44 | 941.9 |
| 2021 | 9 | 29 | 271.7 |
| 2022 | 15 | 40 | 117.6 |
| 2023 | 11 | 31 | 489.4 |
| **2024** | **22** | **40** | **131.4** |

**Sumber: Kementerian Perumahan Kerajaan Tempatan**
*Source: Ministry of Housing and Local Government*

**Jadual 4.7: Statistik nilai kerugian banjir, Sabah, 2022 dan 2023**

*Table 4.7: Statistics on value of flood losses, Sabah, 2022 and 2023*

| Negeri *State* | *Bilangan tempat kediaman *Number of living quarters* | Nilai kerugian banjir *Value of flood losses* | | | | | |
|---|---|---|---|---|---|---|---|
| | | (A) Tempat Kediaman *Living quarters* (RM '000) | | (B) Kenderaan *Vehicles* (RM '000) | | (C) Premis Perniagaan *Business Premises* (RM '000) | |
| | | 2022 | **2023** | 2022 | **2023** | 2022 | **2023** |
| **Malaysia** | **8,046,946** | **168,258** | **372,232** | **22,327** | **17,298** | **53,197** | **54,059** |
| Sabah | 594,163 | 10,997 | 17,318 | 1,631 | 688 | 481 | 1,237 |

| Negeri *State* | Nilai kerugian banjir *Value of flood losses* | | | | | | Jumlah kerugian *Total loss* (RM '000) | |
|---|---|---|---|---|---|---|---|---|
| | (D) Pembuatan *Manufacturing* (RM '000) | | (E) Pertanian *Agriculture* (RM '000) | | (F) Infrastruktur *Infrastructure* (RM '000) | | | |
| | 2022 | **2023** | 2022 | **2023** | 2022 | **2023** | 2022 | **2023** |
| **Malaysia** | **10,260** | **1,163** | **120,629** | **185,222** | **380,742** | **303,380** | **755,413** | **933,354** |
| Sabah | - | - | 196 | 684 | 12,835 | 16,914 | 26,140 | 36,840 |

**Nota: * Bilangan Tempat Kediaman merujuk kepada data Banci Penduduk dan Perumahan Malaysia 2020.**

*Notes: Number of Living Quarters refers to the data of Population and Housing Census Malaysia 2020.*

**"-" Tidak terkesan banjir**

*Not affected by the flood*

**Data mengikut negeri bagi Pertanian dan Infrastruktur bagi tahun 2021 tidak diterbitkan**

*Data by state for Agriculture and Infrastructure for year 2021 were not published*

**"n.a" - Data tidak tersedia**

*Data not available*

**Jadual 4.8: Taburan kawasan hakisan pantai, Sabah, 2024**

*Table 4.8: Distribution of coastal erosion areas, Sabah, 2024*

Panjang (km)
*Length*

| Negeri *State* | Jumlah (km) *Total* | Pantai yang mengalami hakisan mengikut kategori *Coastal erode by category* | | | | | | Jumlah hakisan (km) *Total erosion* | % |
|---|---|---|---|---|---|---|---|---|---|
| | | Kategori 1 *Category 1* | | Kategori 2 *Category* | | Kategori 3 *Category* | | | |
| | | Bil. kawasan *No. of area* | Panjang agregat (km) *Aggregate length* | Bil. kawasan *No. of area* | Panjang agregat (km) *Aggregate length* | Bil. kawasan *No. of area* | Panjang agregat (km) *Aggregate length* | | |
| **Malaysia** | **8,840.00** | **44** | **55.4** | **309** | **375.9** | **2,344** | **916.3** | **1,347.60** | **15.2** |
| Sabah | 3752.9 | 3 | 3 | 63 | 79.1 | 1120 | 347.2 | 429.3 | 11.4 |

**Sumber: Jabatan Pengairan dan Saliran**

*Source: Department of Irrigation and Drainage*

**Nota/** *Notes*:

**Kategori 1: Pengunduran garis pantai yang cepat dengan kadar melebihi 4 meter/ tahun umumnya di kawasan dengan penduduk yang agak padat bersama aktiviti komersial/industri yang mendapat perkhidmatan infrastruktur dan kemudahan awam.**

*Category 1: Fast retreating coastline at the rate of more than 4 metre/ year with generally fairly dense human settlement, with some commercial/ industrial activities being served by significant public infrastructure and facilities.*

**Kategori 2: Pengunduran garis pantai dengan kadar lebih dari 1 meter/ tahun tetapi kurang dari 4 meter/tahun umumnya di kawasan berpenduduk tidak padat dengan sedikit aktiviti pertanian yang mendapat perkhidmatan infrastruktur dan kemudahan awam yang kurang sempurna.**

*Category 2: Retreating coastline at the rate of between more than 1 metre/ year but less than 4m/ year with generally sparsely-populated area, with some agricultural activities being served by relatively minor public infrastructure and facilities*

**Kategori 3: Pengunduran garis pantai dengan kadar kurang dari 1 meter/ tahun umumnya di kawasan tanpa penduduk dengan aktiviti pertanian yang minimum yang tidak mendapat perkhidmatan infrastruktur dan kemudahan awam.**

*Category 3: Slowly retreating coastline of less than 1 metre/ year with generally no human settlement and minimal agricultural activities, and not served by public infrastructure and facilties.*

**Berdasarkan *National Coastal Erosion Study for Malaysia (2015)***

*Based on National Coastal Erosion Study for Malaysia (2015)*

**Jadual 5.1: Anggaran penduduk pertengahan tahun, Sabah, 2021-2025**

*Table 5.1: Mid-year population estimates, Sabah, 2021-2025*

| Tahun *Year* | 2021 | 2022 | 2023 | 2024 | **2025[p]** | Kadar pertumbuhan penduduk tahunan *Annual population growth rate (%)* | |
|---|---|---|---|---|---|---|---|
| | ('000) | | | | | **2023/2024** | **2024/2025** |
| Penduduk *Population* | 3,412.6 | 3,414.9 | 3,596.7 | 3,742.0 | 3,759.6 | **4.0** | **0.5** |

**Nota/** *Notes* **:**

**Berdasarkan Anggaran Penduduk Pertengahan Tahun berasaskan data Banci Penduduk dan Perumahan 2020**
*Mid-Year Population Estimates based on Population and Housing Census of Malaysia 2020*

[p] **Permulaan**/ *Preliminary*

**Hasil tambah mungkin berbeza kerana pembundaran**
*The added total may differ due to rounding*

**Jadual 5.2: Kepadatan penduduk, Sabah, 2021-2025**

*Table 5.2: Population density, Sabah, 2021-2025*

Bilangan orang bagi setiap km$^2$
*Number of persons per km$^2$*

| Tahun *Year* | 2021 | 2022 | 2023 | 2024 | **2025[p]** |
|---|---|---|---|---|---|
| Kepadatan penduduk *Population density* | 46 | 46 | 49 | 50 | **51** |

**Nota/** *Notes* **:**

**Berdasarkan Anggaran Penduduk Pertengahan Tahun berasaskan data Banci Penduduk dan Perumahan 2020**
*Mid-Year Population Estimates based on Population and Housing Census of Malaysia 2020*

[p] **Permulaan**/ *Preliminary*

**Hasil tambah mungkin berbeza kerana pembundaran**
*The added total may differ due to rounding*

**Jadual 5.3: Penduduk dengan air paip yang dirawat mengikut strata, Sabah, 2021-2024**

*Table 5.3: Population with treated piped water by state, Sabah, 2021-2024*

| Tahun *Year* | 2021 | | | 2022 | | | 2023 | | | **2024** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Strata | Bandar *Urban* | Luar bandar *Rural* | Purata negeri *State average* | Bandar *Urban* | Luar bandar *Rural* | Purata negeri *State average* | Bandar *Urban* | Luar bandar *Rural* | Purata negeri *State average* | Bandar *Urban* | Luar bandar *Rural* | Purata negeri *State average* |
| Peratus *Per cent* | 100.0 | 56.0 | 78.0 | 100.0 | 61.0 | 80.5 | 100.0 | 69.0 | 83.0 | **99.0** | **70.5** | **85.4** |

**Jadual 5.4: Kadar tarif air bagi domestik, Sabah, 2024**

*Table 5.4 : Water tariff rates for domestic, Sabah, 2024*

RM/$m^3$

| Negeri *State* | Semakan tarif terakhir *Last tariff review* | Purata tarif air *Average water tariff* | | |
|---|---|---|---|---|
| | | 20$m^3$ pertama *first 20$m^3$* | 30$m^3$ pertama *first 30$m^3$* | 35$m^3$ pertama *first 35$m^3$* |
| Sabah | 2020 | 0.60 | 1.10 | - |

**Jadual 5.5: Kadar tarif air bagi industri, Sabah, 2024**

*Table 5.5: Water tariff rates for industry, Sabah, 2024*

RM/$m^3$

| Negeri *State* | Semakan tarif terakhir *Last tariff review* | Purata tarif air *Average water tariff* | | |
|---|---|---|---|---|
| | | 80$m^3$ pertama *first 80$m^3$* | 120$m^3$ pertama *first 120$m^3$* | 500$m^3$ pertama *first 500$m^3$* |
| Sabah | 2020 | 1.60 | 2.00 | - |

**Sumber: Kementerian Peralihan Tenaga dan Transformasi Air, Suruhanjaya Perkhidmatan Air Negara**

*Source: Ministry of Energy Transition and Water Transformation, National Water Services Commission*

**Jadual 5.6: Peratusan isi rumah yang mendapat kemudahan bekalan elektrik mengikut strata, Sabah, 2022**

*Table 5.6: Percentage of households access with electricity supply by strata, Sabah, 2022*

| | Kemudahan bekalan elektrik<br>*Accessible to electricity* | | |
|---|---|---|---|
| | **Jumlah**<br>*Total* | Bandar<br>*Urban* | Luar bandar<br>*Rural* |
| **Malaysia** | **99.7** | **99.9** | **99.0** |
| Sabah | 99.0 | 99.8 | 97.7 |

**Nota: Berdasarkan Laporan Survei Kemudahan Asas 2022**

*Note: Based on Basic Amenities Survey Report 2022*

**Jadual 5.7: Tarif elektrik, Sabah**

*Table 5.7: Electricity tariff, Sabah*

| **Bil.**<br>*No.* | **Kategori tarif**<br>*Tariff category* | **Unit** | **Kadar semasa**<br>*Current rate* |
|---|---|---|---|
| **1** | **Tarif DM - Tarif kediaman**<br>*Tariff DM - Domestic tariff* | | |
| | 100 kWj pertama (1-100 kWj) sebulan<br>*For the first 100 kWh (1-100 kWh) per month* | sen/kWj<br>*cent/kWh* | 17.50 |
| | 100 kWj berikutnya (101-200 kWj) sebulan<br>*For the next 100 kWh (101-200 kWh) per month* | sen/kWj<br>*cent/kWh* | 18.50 |
| | 300 kWj berikutnya (201-300 kWj) sebulan<br>*For the next 300 kWh (201-300 kWh) per month* | sen/kWj<br>*cent/kWh* | 33.00 |
| | 200 kWj berikutnya (301-500 kWj) sebulan<br>*For the next 200 kWh (301-500 kWh) per month* | sen/kWj<br>*cent/kWh* | 44.50 |
| | 500 kWj berikutnya (501-1000 kWj) sebulan<br>*For the next 500 kWh (501-1000 kWh) per month* | sen/kWj<br>*cent/kWh* | 45.00 |
| | Setiap kWj berikutnya (1001 kWj ke atas) sebulan<br>*For the next kWh (1001 kWh and above) per month* | sen/kWj<br>*cent/kWh* | 47.00 |
| | Caj minimum bulanan<br>*Minimum monthly charge* | RM/*kW* | 5.00 |
| **2** | **Tarif CM1 - Tarif Perdagangan voltan rendah**<br>*Tariff CM1 - Low voltage commercial tariff* | | |
| | 200 kWj pertama (1-200 kWj) sebulan<br>*For the first 200 kWh (1-200 kWh) per month* | sen/kWj<br>*cent/kWh* | 38.50 |
| | Setiap kWj berikutnya (201 kWj ke atas) sebulan<br>*For the next kWh (201 kWh and above) per month* | sen/kWj<br>*cent/kWh* | 39.50 |
| | Caj minimum bulanan<br>*Minimum monthly charge* | RM | 15.00 |
| **3** | **Tarif CM2 - Perdagangan am voltan sederhana**<br>*Tariff CM2 - Medium voltage general commercial tariff* | | |
| | Bagi setiap kilowatt kehendak maksimum sebulan<br>*For each kilowatt of maximum demand per month* | RM/*kW* | 23.20 |
| | Bagi semua kWj<br>*For all kWh* | sen/kWj<br>*cent/kWh* | 32.40 |
| | Caj minimum bulanan<br>*Minimum monthly charge* | RM | 1000.00 |

**Jadual 5.7: Tarif elektrik, Sabah (samb.)**

*Table 5.7: Electricity tariff, Sabah (cont'd)*

| Bil.<br>*No.* | Kategori tarif<br>*Tariff category* | Unit | Kadar semasa<br>*Current rate* |
|---|---|---|---|
| **4** | **Tarif CM3 - Tarif perdagangan**<br>*Tariff CM3 - Commercial tariff* | | |
| | Puncak/luar puncak voltan sederhana<br>*Tariff CM3 – Medium voltage peak/off peak commercial* | | |
| | Bagi setiap kilowatt kehendak maksimum sebulan dalam tempoh puncak<br>*For each kilowatt of maximum demand per month during the peak period* | RM/*kW* | 32.60 |
| | Bagi semua kWj dalam tempoh puncak<br>*For all kWh during the peak period* | sen/kWj<br>*cent/kWh* | 32.40 |
| | Bagi semua kWj dalam tempoh luar puncak<br>*For all kWh during the off-peak period* | sen/kWj<br>*cent/kWh* | 19.50 |
| | Caj minimum bulanan<br>*Minimum monthly charge* | RM | 1000.00 |
| **5** | **Tarif ID1 – Tarif perindustrian voltan rendah**<br>*Tariff ID1 - Low voltage Industrial tariff* | | |
| | Bagi semua kWj<br>*For all kWh* | sen/kWj<br>*cent/kWh* | 37.60 |
| | Caj minimum bulanan<br>*Minimum monthly charge* | RM | 15.00 |
| **6** | **Tarif F1 - Perlombongan am voltan sederhana**<br>*Tariff F1 - Medium voltage general mining tariff* | | |
| | Bagi setiap kilowatt kehendak maksimum sebulan dalam tempoh puncak<br>*For each kilowatt of maximum demand per month during the peak period* | RM/<br>kW | 21.75 |
| | Bagi semua kWj<br>*For all kWh* | sen/kWj<br>*cent/kWh* | 26.80 |
| | Caj minimum bulanan<br>*Minimum monthly charge* | RM | 1000.00 |
| **7** | **Tarif ID3 - Tarif perindustrian puncak/luar puncak voltan sederhana**<br>*Tariff ID3 - Medium voltage peak/off peak industrial* | | |
| | Bagi setiap kilowatt kehendak maksimum sebulan dalam tempoh puncak<br>*For each kilowatt of maximum demand per month during the peak period* | sen/kWj<br>*cent/kWh* | 28.00 |
| | Bagi semua kWj dalam tempoh puncak<br>*For all kWh during the peak period* | sen/kWj<br>*cent/kWh* | 28.60 |
| | Bagi semua kWj dalam tempoh luar puncak<br>*For all kWh during the off-peak period* | RM | 18.00 |
| | Caj minimum bulanan<br>*Minimum monthly charge* | RM | 1000.00 |
| **8** | **Tarif PL - Tarif lampu jalanraya**<br>*Tariff PL - Public lighting* | | |
| | Bagi semua kWj (Tidak termasuk senggaraan)<br>*For all kWh (excluding maintenance)* | sen/kWj<br>*cent/kWh* | 20.30 |
| | Bagi semua kWj (termasuk senggaraan)<br>*For all kWh (including maintenance)* | sen/kWj<br>*cent/kWh* | 36.30 |
| | Caj minimum bulanan<br>*Minimum monthly charge* | RM | 15.00 |

**Sumber: Sabah Electricity Sdn Bhd.**

*Source: Sabah Electricity Sdn. Bhd.*

**Jadual 5.8: Penjanaan tenaga elektrik mengikut stesen, Sabah, 2020-2024**

*Table 5.8: Electricity generated by station, Sabah, 2020-2024*

Juta kWj
*Million kWh*

| Tahun *Year* | Stesen wap *Steam stations* | Stesen diesel *Diesel stations* | Stesen hidro *Hydro stations* | Turbin gas *Gas turbines* | Lain-lain[1] *Others* | **Jumlah** *Total* |
|---|---|---|---|---|---|---|
| 2020 | 78.7 | 507.1 | 421.7 | 5,673.60 | 433 | 7,035.40 |
| 2021 | 79.6 | 633.5 | 392.1 | 5,778.90 | 455.7 | 7,260.20 |
| 2022 | 73.7 | 660.7 | 315.8 | 6,396.40 | 563.5 | 7,936.30 |
| 2023 | 72.3 | 768.8 | 15.9 | 6,782.30 | 646.9 | 8,213.90 |
| **2024[p]** | **73.6** | **812.8** | **235.2** | **7,012.10** | **825.5** | **8,885.60** |

**Nota: [1] merujuk kepada biomas**
*Notes: refers to biomass*

**Sumber: Sabah Electricity Sdn Bhd**
*Source: Sabah Electricity Sdn. Bhd*

[p] **Permulaan**/ *Preliminary*

**Juta kWj**/ *Million kWh*

**Kilowatt-jam**/ *Kilowatt-hours*

**Jadual 5.9: Bilangan ketibaan dan pelepasan kapal laut yang terlibat dalam perdagangan antarabangsa, Sabah, 2019-2023**

*Table 5.9: Number of arrivals and departures of ocean-going vessel engaged in foreign trade at selected ports, Sabah, 2019-2023*

| Pelabuhan *Port* | Ketibaan *Arrivals* | | | | | Berlepas *Departures* | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2019 | 2020 | 2021 | 2022 | **2023[e]** | 2019 | 2020 | 2021 | 2022 | **2023[e]** |
| Kota Kinabalu | 843 | 339 | 430 | 455 | 10,150 | 483 | 339 | 417 | 443 | 10,009 |
| Kudat dan Kunak | 169 | 136 | 4 | - | - | 169 | 136 | 4 | - | - |
| Lahad Datu | 559 | 500 | 500 | 481 | - | 559 | 500 | 497 | 480 | - |
| Sandakan | 822 | 756 | 492 | 518 | - | 822 | 756 | 488 | 511 | - |
| Sepanggar Bay Oil terminal | 253 | 200 | - | - | - | 253 | 200 | - | - | - |
| Sepanggar Bay Container Port | 240 | 154 | - | - | - | 240 | 154 | - | - | - |
| Tawau | 597 | 544 | 404 | 400 | - | 597 | 544 | 413 | 397 | - |

**Sumber: Jabatan Laut Malaysia, *Sabah Ports Sdn Bhd***
*Source: Malaysia Marine Department, Sabah Ports Sdn Bhd*

**Jadual 5.10: Kargo yang dikendalikan mengikut pelabuhan, Sabah, 2020-2024**

*Table 5.10: Cargo throughput by port, Sabah, 2020-2024*

Berat muatan '000
*Freightweight tonnes*

| Pelabuhan *Port* | | 2020 | 2021 | 2022 | 2023 | **2024** |
|---|---|---|---|---|---|---|
| Sabah | **Jumlah** *Total* | 29,558 | 30,151 | 29,234 | 27,547 | **14,228** |
| | Import *Imports* | 10,674 | 11,904 | 12,724 | 12,093 | **13,664** |
| | Eksport *Exports* | 18,883 | 18,247 | 16,510 | 15,453 | **564** |

**Nota: Tidak termasuk pindah kapal**
*Note: Excluding trans-shipment*

**Sumber: Kementerian Pengangkutan**
*Source: Ministry of Transport*

**Jadual 5.11: Kadar insiden keracunan makanan, kolera dan tifoid, Sabah, 2020-2024**

*Table 5.11: Incidence rate food poisoning, cholera and typhoid, Sabah, 2020-2024*

Bagi setiap 100,000 penduduk
*Per 100,000 population*

| Insiden *Incidence* | 2020 | 2021 | 2022 | 2023 | **2024** |
|---|---|---|---|---|---|
| Keracunan makanan *Food poisoning* | 15.9 | 11.5 | 59.1 | 36.4 | **44.2** |
| Kolera *Cholera* | 2.9 | 1.6 | 0.2 | 1.3 | **1.8** |
| Tifoid[1] *Typhoid* | 0.6 | 0.9 | 0.5 | 0.5 | **0.8** |

**Nota: [1] Mulai tahun 2019, penyakit Tifoid termasuk Paratyphi**
*Notes: Starting from year 2019, Typhoid also include Paratyphi*

**Sumber: Kementerian Kesihatan Malaysia**
*Source: Ministry of Health Malaysia*

**Jadual 5.12: Bilangan kes demam denggi, demam denggi berdarah dan malaria, Sabah, 2020-2024**

*Table 5.12: Number of dengue fever, dengue haemorrhagic fever and malaria cases, Sabah, 2020-2024*

| Kes *Cases* | 2020 | 2021 | 2022 | 2023 | **2024** |
|---|---|---|---|---|---|
| Demam denggi *Dengue fever* | 4,057 | 1,758 | 7,092 | 6,983 | **5,021** |
| Demam denggi berdarah *Dengue haemorrhagic fever* | 21 | 5 | 18 | - | **6** |
| Malaria | 1,537 | 2,204 | 1,516 | 1,860 | **1,254** |

**Sumber: Kementerian Kesihatan Malaysia**
*Source: Ministry of Health Malaysia*

**Jadual 6.1: Perbelanjaan perlindungan alam sekitar mengikut jenis perbelanjaan, Sabah, 2018-2022**

*Table 6.1: Environmental protection expenditure by type of expenditure, Sabah, 2018-2022*

RM '000

| Negeri *States* | Tahun *Year* | Jumlah *Total* | Pengurusan pencemaran *Pollution management* | Perlindungan hidupan liar & habitat *Protection of wildlife & habitats* | Penilaian dan caj alam sekitar *Environmental assessment and charges* | Pengurusan sisa *Waste management* | Perbelanjaan lain untuk perlindungan alam sekitar *Other environmental protection expenditure* |
|---|---|---|---|---|---|---|---|
| Jumlah *Total* | 2018 | 100,026 | 67,330 | 2,709 | 6,824 | 22,013 | 1,150 |
| | 2019 | 249,863 | 215,962 | 2,228 | 10,207 | 19,689 | 1,777 |
| | 2020 | 109,520 | 74,430 | 4,173 | 7,969 | 19,961 | 2,987 |
| | 2021 | 130,864 | 95,273 | 3,244 | 7,781 | 21,818 | 2,748 |
| | **2022** | **132,048** | **87,888** | **2,490** | **5,635** | **24,790** | **11,245** |
| Modal *Capital* | 2018 | 40,613 | 38,692 | 62 | 1,434 | 395 | 30 |
| | 2019 | 186,456 | 182,704 | 302 | 2,530 | 860 | 59 |
| | 2020 | 29,379 | 26,863 | 104 | 1,105 | 1,283 | 24 |
| | 2021 | 40,830 | 35,747 | 204 | 1,168 | 3,444 | 267 |
| | **2022** | **36,674** | **33,120** | **72** | **285** | **2,484** | **713** |
| Operasi *Operation* | 2018 | 59,413 | 28,638 | 2,647 | 5,390 | 21,618 | 1,120 |
| | 2019 | 63,407 | 33,258 | 1,926 | 7,677 | 18,829 | 1,718 |
| | 2020 | 80,141 | 47,567 | 4,069 | 6,864 | 18,678 | 2,963 |
| | 2021 | 90,034 | 59,526 | 3,041 | 6,612 | 18,374 | 2,481 |
| | **2022** | **95,374** | **54,768** | **2,418** | **5,350** | **22,306** | **10,531** |

**Nota: Berdasarkan kepada Survei Ekonomi Tahunan 2022 - Perbelanjaan Perlindungan Alam Sekitar**

*Notes: Based on the Annual Economic Survey 2022 - Environmental Protection Expenditure*

**Jadual 6.2: Peruntukan dan perbelanjaan pembangunan hutan, Sabah, 2019-2023**

*Table 6.2: Forest development allocation and expenditure, Sabah, 2019-2023*

RM juta
*RM million*

| Bidang Kuasa *Jurisdiction* | Perkara *Items* | 2019 | 2020 | 2021 | 2022 | **2023** |
|---|---|---|---|---|---|---|
| **Jumlah** *Total* | Peruntukan *Allocation* | **33.26** | **45.33** | **53.99** | **51.42** | **54.85** |
| | Perbelanjaan *Expenditure* | **32.68** | **42.87** | **53.75** | **49.08** | **54.69** |
| Negeri *State* | Peruntukan *Allocation* | 17.95 | 20.53 | 18.11 | 21.90 | **19.51** |
| | Perbelanjaan *Expenditure* | 17.40 | 19.34 | 18.07 | 19.56 | **19.37** |
| Persekutuan *Federal* | Peruntukan *Allocation* | 15.31 | 24.80 | 35.88 | 29.52 | **35.33** |
| | Perbelanjaan *Expenditure* | 15.28 | 23.53 | 35.69 | 29.51 | **35.31** |

**Sumber: Jabatan Perhutanan Sabah**

*Source: Sabah Forestry Department*

**Jadual 6.3: Pembangunan sumber hutan, Sabah, 2019-2023**

*Table 6.3: Forest resource development, Sabah, 2019-2023*

Hektar
*Hectares*

| Sumber<br>*Source* | 2019 | 2020 | 2021 | 2022 | **2023** |
|---|---|---|---|---|---|
| Tanaman mengaya<br>*Enrichment planting* | 63,132 | 63,773 | 65,509 | 67,362 | **68,760** |
| Ladang hutan<br>*Forest plantation* | 290,762 | 274,741 | 280,756 | 286,523 | **295,588** |
| Tanaman bakau<br>*Mangroves* | 20 | 24 | 167 | 15 | **2** |
| Rawatan silvikultur<br>*Silviculture treatment* | 393,672 | 417,641 | 431,969 | 447,645 | **461,932** |

**Sumber: Jabatan Perhutanan Sabah**
*Source: Sabah Forestry Department*

# LAMPIRAN

## *APPENDICES*

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***Framework for the Development of Environment Statistics* (FDES) dan hubung kait dengan rangka kerja Daya Penggerak-Tekanan-Keadaan-Impak-Respon (DPSIR)**

*The FDES and its relationship with the Driving Force-Pressure-State-Impact-Response (DPSIR) framework*

Komponen 1 mengandungi statistik ciri-ciri fizikal, biologikal dan kimia berkaitan alam sekitar serta perubahannya dari semasa ke semasa.

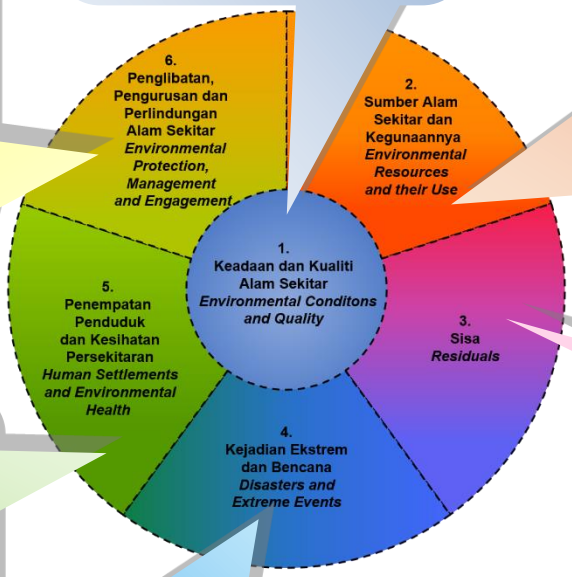
*Component 1 includes statistics about the physical, biological and chemical characteristics of the environment and their changes over time.*

Komponen ini memaparkan maklumat perbelanjaan perlindungan alam sekitar dan pengurusan sumber untuk memelihara alam sekitar serta mengekalkan ekosistem.

*This component organizes information on environmental protection and resource management expenditure to improve the environment and maintain ecosystem health.*

Statistik di dalam Komponen 2 memberi fokus kepada pengukuran dan perubahan stok bagi tujuan pengeluaran dan penggunaan sumber alam sekitar.

*In Component 2, statistics on environmental resources and their use focus on measuring stocks and changes in stocks of these resources and their use for production and consumption.*




Komponen 5 mengandungi statistik mengenai alam sekitar meliputi keadaan kehidupan dan kesihatan persekitaran.

*Component 5 contains statistics on the environment in which humans live particularly with regard to living conditions and environmental health.*

Komponen 3 mengandungi statistik jumlah sisa yang dihasilkan oleh manusia melalui proses pengeluaran & penggunaan, kaedah pengurusan dan pelepasan kepada persekitaran.

*Component 3 contains statistics on the amount of residuals generated by human production & consumption processes, their management, and their final release to the environment.*

Komponen 4 menyusun statistik berkaitan kejadian ekstrem dan bencana serta kesan ke atas kesejahteraan manusia dan infrastruktur persekitaran manusia.

*Component 4 organizes statistics on the occurrence of extreme events and disasters and their impacts on human well-being and the infrastructure of the human subsystem.*

Daya Penggerak: Sosio-ekonomi dan sosio-kultur yang memacu aktiviti manusia bagi meningkatkan atau mengurangkan tekanan terhadap alam sekitar
*Driving Force:* *The socioeconomic and sociocultural forces driving human activities, which increase or mitigate pressures on the environment*

Tekanan: Tekanan aktiviti manusia kepada alam sekitar
*Pressure:* *The stresses that human activities place in the environment*

Keadaan: Situasi terkini alam sekitar
*State:* *The current condition of the environment*

Impak: Kesan degradasi alam sekitar
*Impact:* *The effects of environmental degradation*

Respon: Tindak balas oleh masyarakat terhadap keadaan alam sekitar
*Response:* *Responses by society to the environmental situation*

**Sumber: *Framework for the Development of Environment Statistics* (FDES 2013)**
*Source:*

**Punca dan kesan bahan pencemar udara kepada manusia dan tumbuhan**
*Sources and effects of air pollutants on human and plants*

| **Bahan pencemar udara** *Air pollutant* | **Punca** *Source* | **Kesan kepada kesihatan manusia dan ekologi** *Human health and ecological effects* |
|---|---|---|
| Ozon ($O_3$) *Ozone* | Motosikal dua lejang, kenderaan bermotor dan punca-punca industri. *Two-stroke motorcycles, motor vehicles and industrial sources.* | **Manusia/ *Human*** Menjejaskan fungsi pernafasan dan penurunan prestasi atlet yang melakukan senaman lasak dan bahaya penyakit barah kulit *Impairment of respiratory function and decreasing performance by some athletes exercising heavily and skin cancer risks* **Tumbuhan/ *Plants*** Memusnahkan tumbuhan dan mengurangkan pengeluaran tanaman *Damage vegetation and reduces crop production* |
| Plumbum (Pb) *Lead* | Sektor pengangkutan *Transport sector* | **Manusia/ *Human*** Pendedahan yang berlarutan boleh mengakibatkan gangguan sistem saraf *Long-term exposure can lead to nervous disorders* |
| Karbon Monoksida (CO) *Carbon Monoxide* | Sektor pengangkutan *Transport sector* | **Manusia/ *Human*** Menjejaskan mereka yang merokok dan yang menghidap masalah peredaran darah dan anemia *Affects smokers and people with circulatory and anaemic problems* |
| Sulfur Dioksida ($SO_2$) *Sulphur Dioxide* | Industri minyak dan gas, pengeluaran tenaga, pembakaran arang, proses industri dan industri berasaskan pembakaran *Oil and gas industry, energy production, coal burning, industrial combustion and industrial process* | **Manusia/ *Human*** Menambahkan derita pesakit yang menghidap asma dan bronkitis *Aggravates asthmatic and bronchitis patients* **Tumbuhan/*Plants*** Memusnahkan tumbuhan *Damages vegetation* |
| Nitrogen Dioksida ($NO_2$) *Nitrogen Dioxide* | Pengangkutan, penjanaan kuasa dan industri berasaskan pembakaran *Transport, power generation and industrial combustion* | **Manusia/ *Human*** Menjejaskan fungsi pernafasan *Affects respiratory function* **Tumbuhan/ *Plants*** Menyekat pertumbuhan tanaman *Suppresses vegetation growth* |
| Habuk Halus ($PM_{10}$) *Particulate Matter* | Pembakaran terbuka *Open burning* | **Manusia/ *Human*** Melemahkan fungsi pernafasan *Impairs respiratory function* **Tumbuhan/ *Plants*** Memusnahkan tumbuhan *Damages vegetation* |

**Sumber: Kementerian Kesihatan Malaysia**
*Source: Ministry of Health Malaysia*

**Perbandingan nilai IPU dengan tahap pencemaran dan kawalan kesihatan**
*Comparison of API values with level of pollution and health measures*

| **Indeks Pencemaran Udara (IPU)** *Air Pollutant Index (API)* | **Status** | **Tahap pencemaran** *Level of pollution* | **Kawalan kesihatan** *Health measures* |
|---|---|---|---|
| 0 – 50 | Baik | Pencemaran rendah yang tidak ada kesan buruk terhadap kesihatan | Tidak ada sekatan aktiviti bagi semua lapisan orang. Amalkan gaya hidup yang sihat seperti tidak merokok, kerap bersenam dan mengamalkan pemakanan yang sesuai |
| | *Good* | *Low pollution and has no ill-effects on health* | *No restriction of activities for all groups of people. To practice healthy lifestyle e.g. not to smoke, exercise regularly and to observe proper nutrition* |
| 51 – 100 | Sederhana | Pencemaran sederhana dan tidak ada kesan buruk terhadap kesihatan | Tidak ada sekatan aktiviti bagi semua lapisan orang. Amalkan gaya hidup yang sihat seperti tidak merokok, kerap bersenam dan mengamalkan pemakanan yang sesuai |
| | *Moderate* | *Moderate pollution and has no ill-effects on health* | *No restriction of activities for all groups of people. To practice healthy lifestyle e.g. not to smoke, exercise regularly and to observe proper nutrition* |
| 101 – 200 | Tidak Sihat | Tanda-tanda sederhana yang menyebabkan bertambah teruk di kalangan orang berisiko tinggi, iaitu mereka yang menghidap sakit jantung dan paru-paru | Sekatan aktiviti kegiatan luar terhadap bagi orang yang berisiko tinggi. Penduduk amnya perlu mengurangkan aktiviti yang lasak |
| | *Unhealthy* | *Mild aggravation of symptoms among high risk persons, i.e. those with heart or lung disease* | *Restriction of outdoor activities for high risk persons. The population should reduce vigorous outdoor activity* |
| 201 – 300 | Sangat Tidak Sihat | Tanda-tanda ketara yang menyebabkan bertambah teruk dan toleransi senaman rendah di kalangan orang yang mengidap sakit jantung atau paru-paru | Warga tua dan orang yang menghidap penyakit jantung atau paru-paru dilarang keluar dan kurangkan aktiviti fizikal. Penduduk amnya mesti mengelakkan dari aktiviti luar yang lasak. Sesiapa yang menghadapi masalah kesihatan perlu merujuk kepada doktor |
| | *Very Unhealthy* | *Significant aggravation of symptoms and decreased exercise tolerance in person with heart or lung disease* | *Elderly and persons with known heart or lung disease should stay indoors and reduce physical activity. Population should avoid vigorous outdoor activity. Those with any health problems to consult a doctor* |
| 301 – 500 | Berbahaya | Tanda-tanda yang menyebabkan bertambah teruk dan membahayakan kesihatan | Warga tua dan orang yang menghidap penyakit jantung atau paru-paru dilarang keluar dan kurangkan aktiviti lasak. Penduduk amnya mesti menghindari aktiviti luar yang lasak |
| | *Hazardous* | *Severe aggravation of symptoms and endangers health* | *Elderly and persons with existing heart or lung disease should stay indoors and reduce physical activity. General population should avoid vigorous outdoor activity* |
| Melebihi 500 | Kecemasan | Tanda-tanda yang menyebabkan bertambah teruk dan membahayakan kesihatan | Penduduk amnya dinasihatkan mengikut peraturan oleh Majlis Keselamatan Negara dan sentiasa mengikut pengumuman melalui media massa |
| *Above 500* | *Emergency* | *Severe aggravation of symptoms and endangers health* | *General population are advised to follow the orders of the National Security Council and follow the announcements through the mass media* |

**Sumber: Kementerian Kesihatan Malaysia**
*Source: Ministry of Health Malaysia*

**Klasifikasi kualiti air berdasarkan Indeks Kualiti Air**
*Water quality classification based on Water Quality Index*

| Parameter | Indeks *Index* | | |
|---|---|---|---|
| | **Bersih (B)** *Clean (C)* | **Sederhana Tercemar (ST)** *Slightly Polluted (SP)* | **Tercemar (T)** *Polluted (P)* |
| Indeks Kualiti Air (IKA) *Water Quality Index (WQI)* | 81 – 100 | 60 – 80 | 0 – 59 |
| Keperluan Oksigen Biokimia ($BOD_5$) *Biochemical Oxygen Demand* | 91 – 100 | 80 – 90 | 0 – 79 |
| Ammoniakal Nitrogen ($NH_3$-N) *Ammoniacal Nitrogen* | 92 – 100 | 71 – 91 | 0 – 70 |
| Pepejal Terampai (SS) *Suspended Solids* | 76 – 100 | 70 – 75 | 0 – 69 |

**Sumber: Jabatan Alam Sekitar**
*Source: Department of Environment*

**Klasifikasi Indeks Kualiti Air**
*Water Quality Index classification*

| Parameter | Unit | Kelas *Class* | | | | |
|---|---|---|---|---|---|---|
| | | I | II | III | IV | V |
| Ammoniakal Nitrogen ($NH_3$-N) *Ammoniacal Nitrogen* | mg/l | < 0.1 | 0.1 - 0.3 | 0.3 - 0.9 | 0.9 - 2.7 | > 2.7 |
| Keperluan Oksigen Biokimia ($BOD_5$) *Biochemical Oxygen Demand* | mg/l | < 1 | 1 - 3 | 3 - 6 | 6 - 12 | > 12 |
| Keperluan Oksigen Kimia (COD) *Chemical Oxygen Demand* | mg/l | < 10 | 10 - 25 | 25 - 50 | 50 - 100 | > 100 |
| Oksigen Terlarut *Dissolved Oxygen* | mg/l | > 7 | 5 - 7 | 3 - 5 | 1 - 3 | < 1 |
| pH | - | > 7.0 | 6.0 - 7.0 | 5.0 - 6.0 | < 5.0 | < 5.0 |
| Jumlah Pepejal Terampai (SS) *Total Suspended Solid* | mg/l | < 25 | 25 - 50 | 50 - 150 | 150 - 300 | > 300 |
| Indeks Kualiti Air (IKA) *Water Quality Index (WQI)* | | > 92.7 | 76.5 - 92.7 | 51.9 - 76.5 | 31.0 - 51.9 | < 31.0 |

**Kelas air dan kegunaan**
*Water classes and uses*

| Kelas *Class* | Kegunaan *Uses* |
|---|---|
| Kelas I *Class I* | Pemuliharaan alam semula jadi *Conservation of natural environment* |
| | Bekalan Air I – Hampir tiada rawatan diperlukan *Water Supply I – Practically no treatment necessary* |
| | Perikanan I – Spesis akuatik yang sangat sensitif *Fishery I – Very sensitive aquatic species* |
| Kelas IIA *Class IIA* | Bekalan Air II – Memerlukan rawatan secara konvensional sahaja *Water Supply II – Conventional treatment required* |
| | Perikanan II – Spesis akuatik yang sensitif *Fishery II – Sensitive aquatic species* |
| Kelas IIB *Class IIB* | Kegunaan rekreasi yang melibatkan persentuhan badan dengan air *Recreational use with body contact* |
| Kelas III *Class III* | Bekalan Air III – Memerlukan rawatan yang ekstensif *Water Supply III – Extensive treatment required* |
| | Perikanan III – Spesis tertentu yang mempunyai nilai ekonomi biasa<br>Bekalan air minum haiwan ternakan<br>*Fishery III – Tolerant species with common economic value*<br>*Livestock drinking* |
| Kelas IV *Class IV* | Pengairan *Irrigation* |
| Kelas V *Class V* | Tiada seperti di atas. *None of the above* |

**Sumber: Jabatan Alam Sekitar**
*Source: Department of Environment*

**Standard dan kriteria kualiti air marin**
*Marine water quality criteria and standards*

| | Parameter | KELAS 1<br>*CLASS 1* | KELAS 2<br>*CLASS 2* | KELAS 3<br>*CLASS 3* | KELAS E<br>*CLASS E* |
|---|---|---|---|---|---|
| | Kegunaan<br><br>*Uses* | Pemeliharaan, kawasan dilindungi, Taman Laut<br><br>*Preservation, marine protected areas, Marine Parks* | Kehidupan laut, Perikanan, Terumbu Karang, Rekreasi dan Marikultur<br>*Marine Life, Fisheries, Coral Reefs, Recreational and Mariculture* | Pelabuhan, Lapangan Minyak & Gas<br><br>*Ports, Oil & Gas Fields* | Paya Bakau & Muara Sungai<br><br>*Mangroves, Estuarine & River-mouth Water* |
| 1 | Suhu (°C)<br>*Temperature* | ≤2 °C peningkatan terhadap ambien maksimum<br>*≤2 °C increase over maximum ambient* | | | |
| 2 | Oksigen Terlarut (mg/L)<br>*Dissolved Oxygen* | >80% tepu<br>*>80% saturation* | 5 | 3 | 4 |
| 3 | Jumlah Pepejal Terampai* (mg/L)<br><br>*Total Suspended Solid* | 25 mg/L atau ≤ 10% peningkatan dalam purata bermusim, yang mana lebih rendah<br><br>*25 mg/L or ≤ 10% increase in seasonal average, whichever is lower* | 50 mg/L (25 mg/L) atau ≤ 10% peningkatan dalam purata bermusim, yang mana lebih rendah<br>*50 mg/L (25 mg/L) or ≤ 10% increase in seasonal average, whichever is lower* | 100 mg/L atau ≤ 10% peningkatan dalam purata bermusim, yang mana lebih rendah<br>*100 mg/L or ≤10% increase in seasonal average, whichever is lower* | 100 mg/L atau ≤ 30% peningkatan dalam purata bermusim, yang mana lebih rendah<br>*100 mg/L or ≤ 30% increase in seasonal average, whichever is lower* |
| 4 | Minyak dan Geris (mg/L)<br>*Oil and Grease* | 0.01 | 0.14 | 5 | 0.14 |
| 5 | Raksa*(µg/L)<br>*Mercury* | 0.04 | 0.16 (0.04) | 50 | 0.5 |
| 6 | Kadmium*(µg/L)<br>*Cadmium* | 0.5 | 2 (3) | 10 | 2 |
| 7 | Kromium (VI) (µg/L)<br>*Chromium* | 5 | 10 | 48 | 10 |
| 8 | Kuprum (µg/L)<br>*Copper* | 1.3 | 2.9 | 10 | 2.9 |
| 9 | Arsenik (III)* (µg/L)<br>*Arsenic* | 3 | 20(3) | 50 | 20(3) |
| 10 | Plumbum (µg/L)<br>*Lead* | 4.4 | 8.5 | 50 | 8.5 |
| 11 | Zink (µg/L)<br>*Zinc* | 15 | 50 | 100 | 50 |
| 12 | Sianida (µg/L)<br>*Cyanide* | 2 | 7 | 20 | 7 |
| 13 | Ammonia (tidak terion) (µg/L)<br>*Ammonia (unionized)* | 35 | 70 | 320 | 70 |
| 14 | Nitrit ($NO_2$) (µg/L)<br>*Nitrite ($NO_2$)* | 10 | 55 | 1,000 | 55 |
| 15 | Nitrat($NO_3$) (µg/L)<br>*Nitrate ($NO_3$)* | 10 | 60 | 1,000 | 60 |
| 16 | Fosfat (µg/L)<br>*Phosphate* | 5 | 75 | 670 | 75 |
| 17 | Fenol (µg/L)<br>*Phenol* | 1 | 10 | 100 | 10 |
| 18 | Tributyltin (TBT) (µg/L) | 0.001 | 0.01 | 0.05 | 0.01 |
| 19 | Faecal Coliform | 70 faecal coliform 100mL$^{-1}$ | 70 faecal coliform 100mL$^{-1}$ & (70 faecal coliform 100mL$^{-1}$) | 200 faecal coliform 100mL$^{-1}$ | 100 faecal coliform 100mL$^{-1}$ & (70 faecal coliform 100mL$^{-1}$) |
| 20 | Polycyclic Aromatic Hydrocarbon (PAHs) µg/L | 100 | 200 | 1,000 | 1,000 |

**Sumber: Jabatan Alam Sekitar**
*Source: Department of Environment*

***Nilai Standard dan Kriteria Kualiti Air Marin (SKKAM) dalam kurungan digunakan untuk kawasan air marin yang menjadi sumber makanan laut**
*Marine Water Quality Criteria and Standard (MWQCS) in parentheses are for coastal and marine water areas where seafood for human consumption is applicable*

**Status kualiti air sungai mengikut stesen, Sabah, 2020-2022**
*Water quality status by stations, Sabah, 2020-2022*

| Negeri *State* | Lembangan *Basin* | Sungai *River* | Nombor stesen *Station number* | Nilai IKA / *WQI value* | | | Kategori IKA/ *WQI category* (2022) |
|---|---|---|---|---|---|---|---|
| | | | | 2020 | 2021 | 2022 | |
| Sabah | Sg. Apas | Sg. Apas | 5SAPS001 | 89 | 90 | 92 | B/C |
| | Sg. Balung | Sg. Balung | 5SBLU001 | 87 | 91 | 92 | B/C |
| | Sg. Bengkoka | Sg. Bengkoka | 5SBKK001 | 90 | 91 | 90 | B/C |
| | | Sg. Bengkoka | 5SBKK002 | 86 | 86 | 88 | B/C |
| | Sg. Bingkongan | Sg. Bandau | 5SBKG001 | 91 | 92 | 92 | B/C |
| | | Sg. Bingkongan | 5SBKG005 | 92 | 94 | 93 | B/C |
| | | Sg. Bingkongan | 5SBKG006 | 91 | 94 | 94 | B/C |
| | | Sg. Menggaris | 5SBKG002 | 93 | 93 | 90 | B/C |
| | | Sg. Menggaris | 5SBKG003 | 92 | 92 | 93 | B/C |
| | | Sg. Tandek | 5SBKG004 | 91 | 91 | 91 | B/C |
| | Sg. Bongawan | Sg. Bongawan | 5SBGW001 | 87 | 87 | 88 | B/C |
| | Sg. Brantian | Sg. Brantian | 5SBTN001 | 86 | 84 | 90 | B/C |
| | Sg. Kalabakan | Sg. Kalabakan | 5SKBK001 | 85 | 85 | 90 | B/C |
| | | Sg. Kalabakan | 5SKBK002 | 84 | 84 | 86 | B/C |
| | | Sg. Kalabakan | 5SKBK003 | 82 | 83 | 86 | B/C |
| | Sg. Kalumpang | Sg. Kalumpang | 5SKLP001 | 86 | 86 | 91 | B/C |
| | | Sg. Kalumpang | 5SKLP002 | 86 | 90 | 88 | B/C |
| | | Sg. Kalumpang | 5SKLP003 | 84 | 85 | 86 | B/C |
| | | Sg. Pang Burong 1 | 5SKLP004 | 83 | 86 | 86 | B/C |
| | | Sg. Pang Burong 2 | 5SKLP005 | 69 | 85 | 80 | ST/SP |
| | Sg. Kedamaian | Sg. Kedamaian | 5SKDI004 | 90 | 93 | 92 | B/C |
| | | Sg. Tempasuk | 5SKDI001 | 87 | 93 | 91 | B/C |
| | | Sg. Tempasuk | 5SKDI002 | 91 | 92 | 92 | B/C |
| | | Sg. Wariu | 5SKDI003 | 91 | 93 | 93 | B/C |
| | Sg. Kimanis | Sg. Kimanis | 5SKMA001 | 87 | 90 | 92 | B/C |
| | Sg. Kinabatangan | Sg. Karamuak | 5SKBT006 | 91 | 92 | 92 | B/C |
| | | Sg. Kinabatangan | 5SKBT001 | 85 | 86 | 83 | B/C |
| | | Sg. Kinabatangan | 5SKBT002 | 82 | 84 | 85 | B/C |
| | | Sg. Kinabatangan | 5SKBT004 | 84 | 87 | 84 | B/C |
| | | Sg. Kinabatangan | 5SKBT005 | 86 | 85 | 83 | B/C |
| | | Sg. Koyah | 5SKBT003 | 87 | 89 | 88 | B/C |
| | | Sg. Leepang | 5SKBT009 | 84 | 85 | 84 | B/C |

**Status kualiti air sungai mengikut stesen, Sabah, 2020-2022 (samb.)**
*Water quality status by stations, Sabah, 2020-2022 (cont'd)*

| Negeri *State* | Lembangan *Basin* | Sungai *River* | Nombor stesen *Station number* | Nilai IKA / *WQI value* | | | Kategori IKA/ *WQI category* (2022) |
|---|---|---|---|---|---|---|---|
| | | | | 2020 | 2021 | 2022 | |
| Sabah | Sg. Kinabatangan | Sg. Menanggul | 5SKBT008 | 81 | 86 | 86 | B/C |
| | | Sg. Pin | 5SKBT010 | 86 | 87 | 86 | B/C |
| | | Sg. Takala | 5SKBT007 | 85 | 88 | 87 | B/C |
| | Sg. Labok | Sg. Kinipir | 5SLBK001 | 90 | 91 | 90 | B/C |
| | | Sg. Kinipir | 5SLBK002 | 86 | 91 | 91 | B/C |
| | | Sg. Labok | 5SLBK006 | 87 | 86 | 88 | B/C |
| | | Sg. Liwagu | 5SLBK003 | 88 | 89 | 86 | B/C |
| | | Sg. Liwagu | 5SLBK004 | 88 | 88 | 91 | B/C |
| | | Sg. Maliau | 5SLBK005 | 92 | 94 | 93 | B/C |
| | | Sg. Tungud | 5SLBK007 | 88 | 91 | 85 | B/C |
| | Sg. Lakutan | Sg. Lakutan | 5SLKT001 | 89 | 93 | 88 | B/C |
| | Sg. Likas | Sg. Darau | 5SLKS008 | 80 | 83 | 83 | B/C |
| | | Sg. Inanam | 5SLKS001 | 79 | 81 | 80 | ST/SP |
| | | Sg. Inanam | 5SLKS002 | 84 | 87 | 90 | B/C |
| | | Sg. Inanam | 5SLKS003 | 92 | 93 | 93 | B/C |
| | | Sg. Likas | 5SLKS004 | 77 | 73 | 78 | ST/SP |
| | | Sg. Likas | 5SLKS005 | 78 | 77 | 80 | ST/SP |
| | | Sg. Menggatal | 5SLKS006 | 81 | 87 | 89 | B/C |
| | | Sg. Menggatal | 5SLKS007 | 87 | 91 | 92 | B/C |
| | Sg. Lingkungan | Sg. Bukau | 5SLKG002 | 88 | 92 | 87 | B/C |
| | | Sg. Lingkungan | 5SLKG001 | 91 | 93 | 89 | B/C |
| | Sg. Membakut | Sg. Membakut | 5SMBT001 | 85 | 87 | 89 | B/C |
| | Sg. Menggalong | Sg. Menggalong | 5SMGL001 | 86 | 91 | 85 | B/C |
| | | Sg. Menggalong | 5SMGL002 | 92 | 93 | 92 | B/C |
| | Sg. Merotai | Sg. Merotai | 5SMRT001 | 88 | 90 | 91 | B/C |
| | | Sg. Merotai | 5SMRT002 | 92 | 94 | 92 | B/C |
| | | Sg. Merotai | 5SMRT003 | 87 | 90 | 87 | B/C |
| | Sg. Mounad | Sg. Mounad | 5SMND001 | 85 | 89 | 88 | B/C |
| | | Sg. Mounad | 5SMND002 | 86 | 86 | 89 | B/C |
| | Sg. Moyog | Sg. Moyog | 5SMYG001 | 86 | 88 | 91 | B/C |
| | | Sg. Moyog | 5SMYG002 | 89 | 92 | 91 | B/C |
| | | Sg. Moyog | 5SMYG003 | 92 | 94 | 93 | B/C |
| | | Sg. Moyog | 5SMYG004 | 92 | 94 | 92 | B/C |

**Status kualiti air sungai mengikut stesen, Sabah, 2020-2022 (samb.)**
*Water quality status by stations, Sabah, 2020-2022 (cont'd)*

| Negeri *State* | Lembangan *Basin* | Sungai *River* | Nombor stesen *Station number* | Nilai IKA / *WQI value* | | | Kategori IKA/ *WQI category* (2022) |
|---|---|---|---|---|---|---|---|
| | | | | 2020 | 2021 | 2022 | |
| Sabah | Sg. Padas | Sg. Bunsit | 5SPDS001 | 91 | 93 | 92 | B/C |
| | | Sg. Liawan | 5SPDS002 | 91 | 91 | 92 | B/C |
| | | Sg. Padas | 5SPDS003 | 86 | 87 | 88 | B/C |
| | | Sg. Padas | 5SPDS004 | 88 | 90 | 88 | B/C |
| | | Sg. Padas | 5SPDS005 | 86 | 88 | 87 | B/C |
| | | Sg. Padas | 5SPDS011 | 85 | 88 | 82 | B/C |
| | | Sg. Pangatan | 5SPDS006 | 87 | 88 | 87 | B/C |
| | | Sg. Pegalan | 5SPDS008 | 89 | 91 | 90 | B/C |
| | | Sg. Pegalan | 5SPDS009 | 87 | 86 | 86 | B/C |
| | | Sg. Pegalan | 5SPDS010 | 86 | 87 | 84 | B/C |
| | | Sg. Tandulu | 5SPDS007 | 91 | 92 | 92 | B/C |
| | Sg. Paitan | Sg. Paitan | 5SPTN001 | 85 | 91 | 90 | B/C |
| | Sg. Papar | Sg. Papar | 5SPPR001 | 89 | 91 | 90 | B/C |
| | | Sg. Papar | 5SPPR002 | 90 | 91 | 90 | B/C |
| | | Sg. Papar | 5SPPR003 | 89 | 90 | 88 | B/C |
| | | Sg. Papar | 5SPPR004 | 90 | 91 | 93 | B/C |
| | | Sg. Papar | 5SPPR005 | 92 | 91 | 93 | B/C |
| | Sg. Sapi | Sg. Sapi | 5SSAP002 | 85 | 85 | 83 | B/C |
| | | Sg. Sapi | 5SSAP003 | 86 | 86 | 84 | B/C |
| | | Sg. Sapi | 5SSAP004 | 87 | 88 | 87 | B/C |
| | | Sg. Sualong | 5SSAP001 | 92 | 92 | 93 | B/C |
| | Sg. Segaliud | Sg. Segaliud | 5SSLD001 | 86 | 85 | 81 | B/C |
| | | Sg. Segaliud | 5SSLD002 | 87 | 86 | 84 | B/C |
| | Sg. Segama | Sg. Segama | 5SSGM001 | 86 | 87 | 86 | B/C |
| | | Sg. Segama | 5SSGM002 | 85 | 88 | 87 | B/C |
| | | Sg. Segama | 5SSGM003 | 85 | 88 | 87 | B/C |
| | Sg. Sembulan | Sg. Sembulan | 5SSBL001 | 84 | 81 | 74 | ST/SP |
| | | Sg. Sembulan | 5SSBL002 | 74 | 80 | 69 | ST/SP |
| | Sg. Silabukan | Sg. Silabukan | 5SSBK001 | 86 | 87 | 83 | B/C |
| | | Sg. Silabukan | 5SSBK002 | 89 | 91 | 91 | B/C |

**Status kualiti air sungai mengikut stesen, Sabah, 2020-2022 (samb.)**
*Water quality status by stations, Sabah, 2020-2022 (cont'd)*

| Negeri *State* | Lembangan *Basin* | Sungai *River* | Nombor stesen *Station number* | Nilai IKA / *WQI value* | | | Kategori IKA/ *WQI category* (2022) |
|---|---|---|---|---|---|---|---|
| | | | | 2020 | 2021 | 2022 | |
| Sabah | Sg. Sugut | Sg. Bongkud | 5SSUG001 | 91 | 92 | 93 | B/C |
| | | Sg. Lohan | 5SSUG002 | 91 | 92 | 93 | B/C |
| | | Sg. Merali | 5SSUG003 | 88 | 91 | 90 | B/C |
| | | Sg. Sugut | 5SSUG004 | 91 | 91 | 91 | B/C |
| | | Sg. Sugut | 5SSUG005 | 88 | 92 | 91 | B/C |
| | | Sg. Sugut | 5SSUG006 | 85 | 89 | 87 | B/C |
| | Sg. Tawau | Sg. Tawau | 5STWU001 | 77 | 83 | 78 | ST/SP |
| | | Sg. Tawau | 5STWU002 | 83 | 88 | 88 | B/C |
| | | Sg. Tawau | 5STWU003 | 91 | 93 | 92 | B/C |
| | | Sg. Tawau | 5STWU004 | 91 | 93 | 93 | B/C |
| | Sg. Telipok | Sg. Telipok | 5STLP001 | 70 | 70 | 82 | B/C |
| | | Sg. Telipok | 5STLP002 | 90 | 90 | 91 | B/C |
| | Sg. Tenghilan | Sg. Tenghilan | 5STHL001 | 92 | 92 | 90 | B/C |
| | Sg. Tingkayu | Sg. Tingkayu | 5STKY001 | 84 | 85 | 85 | B/C |
| | | Sg. Tingkayu | 5STKY002 | 86 | 86 | 84 | B/C |
| | Sg. Tuaran | Sg. Damit | 5STUA001 | 89 | 87 | 88 | B/C |
| | | Sg. Damit | 5STUA002 | 87 | 87 | 90 | B/C |
| | | Sg. Song Sai | 5STUA003 | 90 | 92 | 92 | B/C |
| | | Sg. Tuaran | 5STUA004 | 92 | 93 | 93 | B/C |
| | | Sg. Tuaran | 5STUA005 | 92 | 93 | 93 | B/C |
| | Sg. Tungku | Sg. Tungku | 5STKU001 | 89 | 90 | 88 | B/C |
| | | Sg. Tungku | 5STKU002 | 90 | 89 | 90 | B/C |
| | Sg. Umas-Umas | Sg. Umas-Umas | 5SUSM001 | 83 | 84 | 89 | B/C |

**Nota:**
*Notes:*

**Sumber: Jabatan Alam Sekitar**
*Source: Department of Environment*

**B/C: Bersih/** *Clean*
**ST/SP: Sederhana tercemar/** *Slightly polluted*
**T/P: Tercemar/** *Polluted*

**Status kualiti air marin di kawasan pantai, Sabah, 2020-2022**
*Marine water quality status for coastal, Sabah, 2020-2022*

| Negeri *State* | Kawasan *Area* | Nilai IKAM *MWQI Value* | | | Kategori *Category* (2022) |
|---|---|---|---|---|---|
| | | 2020 | 2021 | 2022 | |
| Sabah | Pantai Teluk Brunei 1 | 67 | 73 | 61 | Sederhana/ *Moderate* |
| | Pantai Teluk Brunei 2 | 69 | 84 | 67 | Sederhana/ *Moderate* |
| | Pantai Teluk Brunei 3 | 62 | 75 | 67 | Sederhana/ *Moderate* |
| | Pantai Teluk Brunei 4 | 72 | 84 | 60 | Sederhana/ *Moderate* |
| | Pantai Teluk Brunei 5 | 64 | 69 | 59 | Sederhana/ *Moderate* |
| | Pantai Teluk Brunei 6 | 67 | 58 | 59 | Sederhana/ *Moderate* |
| | Borneo Golf Seawater | 72 | 59 | 67 | Sederhana/ *Moderate* |
| | Pantai Manis Papar | 60 | 59 | 60 | Sederhana/ *Moderate* |
| | Pantai Melinsung | 67 | 70 | 59 | Sederhana/ *Moderate* |
| | Pantai Tanjung Aru (Roll Skating) | 67 | 65 | 57 | Sederhana/ *Moderate* |
| | Pantai Tanjung Aru (No. 3) | 64 | 76 | 57 | Sederhana/ *Moderate* |
| | Pantai Lok Kawi | 72 | 65 | 58 | Sederhana/ *Moderate* |
| | Pantai Tanjung Aru (Rest Lido) | 63 | 69 | 58 | Sederhana/ *Moderate* |
| | Pantai Dalit Tuaran | 78 | 58 | 58 | Sederhana/ *Moderate* |
| | Mangrove Paradise | 73 | 58 | 58 | Sederhana/ *Moderate* |
| | Pantai Sabandar | 75 | 58 | 58 | Sederhana/ *Moderate* |
| | Pantai Bak-Bak Kudat | 62 | 76 | 85 | Baik/*Good* |
| | Pasir Putih Sandakan | 63 | 83 | 82 | Baik/*Good* |
| | Pantai TLDM | 72 | 75 | 62 | Sederhana/ *Moderate* |
| | Pantai Batu Sapi | 61 | 76 | 72 | Sederhana/ *Moderate* |
| | Pantai Ulu Tungku | 66 | 57 | 58 | Sederhana/ *Moderate* |
| | Pantai Sarina Kunak | 74 | 58 | 58 | Sederhana/ *Moderate* |
| | Pantai Kg. Lamak | 64 | 57 | 61 | Sederhana/ *Moderate* |
| | Pantai Tinagat | 58 | 58 | 68 | Sederhana/ *Moderate* |

**Sumber: Jabatan Alam Sekitar**
*Source: Department of Environment*

**Status kualiti air marin di kawasan muara sungai, Sabah, 2020-2022**
*Marine water quality status for estuary, Sabah, 2020-2022*

| Negeri *State* | Kawasan *Area* | Nilai IKAM *MWQI Value* | | | Kategori *Category* (2022) |
|---|---|---|---|---|---|
| | | 2020 | 2021 | 2022 | |
| Sabah | Kuala Penyu | 63 | 58 | 66 | Sederhana/ *Moderate* |
| | Muara Sungai Inanam | 57 | 59 | 58 | Sederhana/ *Moderate* |

**Sumber: Jabatan Alam Sekitar**
*Source: Department of Environment*

**Status kualiti air marin di kawasan pulau, Sabah, 2020-2022**
*Marine water quality status for island, Sabah, 2020-2022*

| Negeri *State* | Kawasan *Area* | Nilai IKAM *MWQI Value* | | | Kategori *Category* (2022) |
|---|---|---|---|---|---|
| | | 2020 | 2021 | 2022 | |
| Sabah | Gaya | 68 | 72 | 58 | Sederhana/ *Moderate* |
| | Mabul | 58 | 71 | 74 | Sederhana/ *Moderate* |
| | Sipadan (N) | 59 | 66 | 86 | Baik/*Good* |
| | Sipadan (W) | 58 | 61 | 62 | Sederhana/ *Moderate* |
| | Sapi | 65 | 81 | 58 | Sederhana/ *Moderate* |
| | Manukan | 75 | 86 | 57 | Sederhana/ *Moderate* |
| | Tiga | 72 | 58 | 61 | Sederhana/ *Moderate* |
| | Kalampunian Besar | 67 | 58 | 64 | Sederhana/ *Moderate* |
| | Kapalai | 58 | 77 | 69 | Sederhana/ *Moderate* |
| | Molleangan Besar | 61 | 61 | 85 | Baik/*Good* |
| | Banggi (South) | 65 | 58 | 81 | Baik/*Good* |
| | Banggi (East) | 75 | 60 | 85 | Baik/*Good* |
| | Balambangan | 69 | 71 | 85 | Baik/*Good* |
| | Selingan | 60 | 74 | 81 | Baik/*Good* |
| | Gulisan | 65 | 70 | 72 | Sederhana/ *Moderate* |
| | Bakungan Kecil | 59 | 75 | 88 | Baik/*Good* |
| | Mantanani Besar | 72 | 58 | 58 | Sederhana/ *Moderate* |

**Sumber: Jabatan Alam Sekitar**
*Source: Department of Environment*

## NOTA DAN SIMBOL
*NOTES AND SYMBOLS*

| | |
|---|---|
| - | tiada/kosong/tiada kes<br>*nil/blank/no cases* |
| .. | tidak diperoleh<br>*not available* |
| n.a. | tidak berkenaan<br>*not applicable* |
| Def. | nilai defektif<br>*defective value* |
| 0.0 | kurang daripada setengah unit terkecil yang ditunjukkan<br>*less than half the smallest unit shown* |
| r | pindaan<br>*revised* |
| e | anggaran<br>*estimate* |
| p | awalan<br>*preliminary* |
| i.e. | iaitu<br>*that is* |
| PM | Habuk Halus<br>*Particulate Matter* |
| CO | Karbon Monoksida<br>*Carbon Monoxide* |
| $NO_2$ | Nitrogen Dioksida<br>*Nitrogen Dioxide* |
| $O_3$ | Ozon<br>*Ground Level Ozone* |
| $SO_2$ | Sulfur Dioksida<br>*Sulphur Dioxide* |
| m/s | meter per saat<br>*metre per second* |
| hPa | hektopascal<br>*hectopascals* |
| $MJ/m^2$ | megajoule per meter persegi<br>*megajoule per square metre* |
| $\mu g/m^3$ | mikrogram setiap meter padu<br>*microgram per cubic metre* |
| ppm | bahagian setiap juta<br>*parts per million* |
| ppb | bahagian setiap bilion<br>*parts per billion* |
| $km^2$ | kilometer persegi<br>*square kilometres* |
| mg/l | miligram setiap liter<br>*milligram per litres* |

| | |
|---|---|
| JKPS<br>*MMscf* | juta kaki padu standard<br>*million standard cubic feet* |
| bil.<br>*no.* | bilangan<br>*number* |
| max. | maksimum<br>*maximum* |
| min. | minimum |
| RM | Ringgit Malaysia |
| FDES | Rangka Kerja untuk Pembangunan Perangkaan Alam Sekitar<br>*Framework for the Development of Environment Statistics* |
| ILP | Institut Latihan Perindustrian<br>*Industrial Training Institute* |
| IPD | Ibu Pejabat Polis Daerah |
| LPG | Gas Asli Cecair<br>*Liquefied Petroleum Gas* |
| MPOB | Lembaga Minyak Sawit Malaysia<br>*Malaysian Palm Oil Board* |
| PERHILITAN<br>*DWNP* | Jabatan Perlindungan Hidupan Liar dan Taman Negara<br>*Department of Wildlife and National Parks* |
| UNEP | Program Alam Sekitar Bangsa-Bangsa Bersatu<br>*United Nations Environment Programme* |
| W.P. | Wilayah Persekutuan |

**NOTA**
*NOTE*

| | |
|---|---|
| Pembundaran:<br>*Rounding:* | Jumlah bagi komponen mungkin berbeza dengan jumlah besar dalam jadual penerbitan disebabkan oleh pembundaran angka<br>*The sum of components may not add up to the totals in the tables presented in this publication due to rounding* |

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# GLOSARI

# *GLOSSARY*

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| TERMA | PENERANGAN | *TERMS* | *EXPLANATIONS* |
|---|---|---|---|
| **A** | | | |
| **Air payau** | Air yang mengandungi garam yang mana kepekatan garamnya kurang daripada kepekatan garam dalam air laut. Kepekatan jumlah garam yang terlarut biasanya dalam lingkungan 1,000-10,000 miligram per liter (mg/l). | ***Brackish water*** | *Water containing salts at a concentration significantly lower than that of sea water. The concentration of total dissolved salts is usually in the range of 1,000-10,000 milligrams per litre (mg/l).* |
| **Air tawar** | Air bersih semula jadi yang mengandungi kurang kepekatan garam. Pada amnya ia sesuai untuk pengeluaran dan dirawat supaya menjadi air bersih yang sesuai untuk minum. | ***Freshwater*** | *Naturally occurring water has a low concentration of salts. It is generally accepted as suitable for abstraction and treatment to produce potable water.* |
| **Aktiviti perlindungan alam sekitar** | Tujuan utama adalah pencegahan, pengurangan dan penghapusan pencemaran atau lain-lain bentuk degradasi alam sekitar. | ***Environmental protection activities*** | *Primary purpose is the prevention, reduction and elimination of pollution and other forms of degradation of the environment.* |
| **Ammoniakal Nitrogen ($NH_3$-N)** | Komponen nitrogen yang digunakan sebagai penunjuk untuk menentukan pencemaran oleh kumbahan. Ia terhasil daripada aktiviti mikrobiologi dan biasanya wujud di dalam air permukaan dan air bawah tanah. Sumber utama bagi bahan pencemar $NH_3$-N adalah kumbahan domestik dan ladang ternakan. | ***Ammoniacal Nitrogen*** | *A component of nitrogen which is adopted as an indicator to determine pollution by sewage. It is formed from microbiology activity and usually exists inside surface water and groundwater. The main sources of $NH_3$-N were domestic sewage and livestock farming.* |
| **Akuakultur** | Akuakultur ialah proses pengeluaran yang melibatkan pengkulturan (termasuk tuaian) organisma akuatik (ikan, moluska, krustasia, tumbuhan) dengan menggunakan teknik yang direka bentuk untuk meningkatkan pengeluaran organisma tersebut melebihi kapasiti persekitaran semula jadinya. | ***Aquaculture*** | *Aquaculture refer to the production process involving the culturing or farming (including harvesting) of aquatic organisms (fish, molluscs, crustaceans, plant) using techniques designed to increase the production of the organism beyond the natural capacity of the environment.* |
| **Atmosfera** | Jisim udara yang mengelilingi bumi yang sebahagian besarnya terdiri daripada oksigen dan nitrogen. | ***Atmosphere*** | *Mass of air surrounding the earth, composed largely of oxygen and nitrogen.* |
| **B** | | | |
| **Bahan pencemar udara** | Bahan yang terkandung di dalam udara pada kepekatan yang cukup tinggi, boleh memudaratkan kesihatan manusia, haiwan, tanaman dan harta benda. Pencemar udara adalah termasuk bahan yang hampir kepada bentuk asal atau kandungan tiruan yang wujud terapung di udara. Ia boleh terdiri daripada pepejal, titisan cecair, gas atau gabungan kesemuanya. | ***Air pollutants*** | *Substances in air that could, at high enough concentrations, harm human beings, animals, vegetation or material. Air pollutants may thus include forms of matter of almost any natural or artificial composition capable of being airborne. They may consist of solid particles, liquid droplets or gases or combination of these forms.* |

| TERMA | PENERANGAN | *TERMS* | *EXPLANATIONS* |
|---|---|---|---|
| **Bahan pencemar** | Bahan yang terdapat dalam kepekatan yang boleh membahayakan organisma (manusia, tumbuhan dan haiwan) atau melebihi standard kualiti alam sekitar. Istilah ini sering digunakan seiring dengan pencemar. | ***Pollutant*** | *Substance that is present in concentration that may harm organisms (humans, plants and animals) or exceed an environmental quality standard. The term is frequently used synonymously with contaminant.* |
| **Banjir** | Kuantiti air yang melimpah keluar dari tebing sungai, tasik atau sistem perparitan sedia ada yang disebabkan oleh curahan hujan yang lebat, air laut pasang dan halangan pada sistem saliran. | ***Flood*** | *A body of water, rising, swelling and overflowing land not usually thus covered. It is also, overflowing of the bank of a stream, lake or drainage system of water onto adjacent land due to storm tidal action and channel obstruction.* |
| **Bencana** | Bencana merupakan peristiwa luar jangka dan berlaku secara tiba-tiba yang boleh menyebabkan kerosakan, kemusnahan dan penderitaan manusia. Bencana sering digambarkan sebagai kesan daripada pendedahan kepada peristiwa melampau dan boleh dikelaskan sebagai semula jadi dan teknologi bergantung kepada punca. | ***Disasters*** | *Disasters are unforeseen and often sudden events that cause great damage, destruction and human suffering. A disaster is often described as a result of exposure to and extreme event and can be both natural and technological depending on their cause.* |
| **Bencana teknologi** | Mungkin disebabkan oleh niat, kecuaian dan kesilapan manusia, atau daripada aplikasi teknologi yang rosak atau gagal. Tiga jenis bencana teknologi: kemalangan industri, kemalangan pengangkutan dan pelbagai kemalangan. | ***Technological disasters*** | *May arise as a result of human intent, negligence or error, or from faulty or failed technological applications. Three types of technological disasters: industrial accidents, transport accidents and miscellaneous accidents.* |
| **Buangan terjadual** | Merupakan buangan toksik dan berbahaya yang dihasilkan oleh industri, pertanian, bengkel, kontraktor buangan terjadual, aktiviti domestik dan buangan klinikal dari hospital. Kategori sisa adalah yang tersenarai dalam Jadual Pertama Peraturan Kualiti Alam Sekeliling (Buangan Terjadual) 2005. | ***Scheduled waste*** | *Defined as toxic waste and hazardous generated by industries, agriculture, workshop, scheduled waste contractors, domestic activities and clinical wastes from hospitals. The waste category listed in the First Schedule Environmental Quality Regulation (Scheduled Waste) 2005.* |
| **D** | | | |
| **Rangka Kerja *Driving Force-Pressure-State-Impact-Response* (DPSIR)** | Rangka analitikal yang berdasarkan hubungan di antara komponen D-P-S-I-R. | ***Driving Force-Pressure-State-Impact-Response (DPSIR) framework*** | *An analytical framework that is based on the casual relationship between its D-P-S-I-R components.* |
| **Demam denggi** | Penyakit jangkitan virus yang merebak melalui gigitan nyamuk Aedes aegypti yang telah dijangkiti. | ***Dengue fever*** | *A type of viral infection that spreads through infected Aedes aegypti mosquito bites.* |

| TERMA | PENERANGAN | *TERMS* | *EXPLANATIONS* |
|---|---|---|---|
| **Disentri** | Disentri adalah cirit-birit akut yang mengandungi darah di dalam najis. Disentri kebanyakannya disebabkan oleh spesies Shigella (*disentri bacillary*) atau *Entamoeba histolytica* (*disentri amoebic).* | ***Dysentery*** | *Dysentery is acute diarrhoea with visible blood in the stool. Dysentery is most often caused by Shigella species (bacillary dysentery) or Entamoeba histolytica (amoebic dysentery).* |
| **F** | | | |
| **Fauna** | Semua kehidupan haiwan. | ***Fauna*** | *All animal life.* |
| **Flora** | Semua kehidupan tumbuhan. | ***Flora*** | *All plant life.* |
| **H** | | | |
| **Habuk Halus (PM)** | Partikel pepejal atau titisan cecair dalam udara atau pelepasan yang saiznya 0.01-100µm, contohnya habuk, asap, wasap, semburan dan kabut. | ***Particulate Matter (PM)*** | *Solid particles or liquid droplets in the air or emission 0.01-100µm size, eg: dust, smoke, fume, spray and mist.* |
| **Habuk Halus ($PM_{10}$)** | Partikel terampai berukuran kurang daripada diameter 10 mikron. $Pm_{10}$ boleh berbentuk pepejal atau cecair dan ia termasuk aerosol, debu, asap dan debunga. Partikel ini berpunca daripada stesen janakuasa, proses industri dan aktiviti pembakaran terbuka. | ***Particulate Matter ($PM_{10}$)*** | *Respirable particles of less than 10 micron in diameter. $PM_{10}$ can be in solid or liquid form and it includes aerosol, dust, smoke and pollen. These particles originate from power plants, industrial processes and open burning activities.* |
| **Halaju angin** | Suatu kuantiti vektor di mana ia mempunyai magnitud dan arah. Magnitud halaju angin dipanggil laju angin manakala arah angin merujuk dari mana angin bertiup. | ***Wind velocity*** | *A quantity of vectors in which it has magnitude and direction. The magnitude of the wind velocity is called the wind speed while the wind direction refers to where the wind blows.* |
| **Hakisan** | Proses penghausan permukaan fizikal. Biasanya dikaitkan dengan kehilangan tanah disebabkan air, salji atau angin. Hakisan berlaku secara semula jadi dan menyebabkan bertambah buruk akibat pembersihan tanah yang berkaitan dengan aktiviti manusia seperti pertanian, perumahan atau perindustrian. | ***Erosion*** | *Wearing away and transport of the soil by wind or running water, glaciers or waves. Erosion occurs naturally but is often intensified by human land-clearing activities related to farming, residential or industrial development.* |
| **Hutan** | Tanah merangkumi lebih daripada 0.5 hektar dengan ketinggian pokok lebih daripada 5 meter dan penutup kanopi lebih daripada 10 peratus, atau pokok yang dapat mencapai ambang in situ. Ia tidak termasuk tanah yang didominasi oleh penggunaan tanah pertanian atau bandar. | ***Forest*** | *Land spanning more than 0.5 hectares with tree higher than 5 metres and a canopy cover of more than 10 per cent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use.* |

| TERMA | PENERANGAN | *TERMS* | *EXPLANATIONS* |
|---|---|---|---|
| **Hutan bandar** | Menanam, memelihara dan mengurus pokok di kawasan awam seperti taman rekreasi, taman permainan dan kawasan lapang termasuk sepanjang lebuh raya. | ***Urban forest*** | *Planting, protecting and managing trees in public areas such as recreational parks, playgrounds and open spaces includes the route along the highway.* |
| **Hutan Simpanan Kekal (HSK)** | Mana-mana tanah (tanah berhutan dan tidak berhutan) yang diwartakan atau disifatkan sebagai HSK untuk tujuan perhutanan di bawah Seksyen 7, 8 dan 9, Akta Perhutanan Negara. | ***Permanent Reserved Forest (PRF)*** | *Any land (forested and non-forested land) that has been enacted or deemed PRF for forestry purposes under Sections 7, 8 and 9, the National Forestry Act.* |
| **I** | | | |
| **Indeks Kualiti Air** | Purata pemberat bagi kepekatan ambien bahan pencemar terpilih biasanya berkait kepada pengelasan kualiti air. | ***Water Quality Index*** | *Weighted average of selected ambient concentrations of pollutants usually linked to water quality classes.* |
| **Indeks Pencemaran Udara (IPU)** | Satu indikator yang dicipta berdasarkan kepada penilaian saintifik bagi memaklumkan dengan cara yang mudah difahami kehadiran pencemaran udara dan impaknya terhadap kesihatan manusia. Nilai IPU dikira berdasarkan kepekatan purata setiap pencemar udara iaitu $SO_2$, $NO_2$, CO, $O_3$ dan $PM_{10}$. Pencemar udara yang dominan dengan kepekatan tertinggi diambil kira sebagai pencemar yang akan menentukan nilai IPU. Pada lazimnya, kepekatan $PM_{10}$ adalah yang tertinggi berbanding dengan pencemar yang lain dan ini menentukan bacaan IPU. | ***Air Pollutant Index (API)*** | *An indicator which is created based on scientific assessment to provide user friendly information about the presence of air pollution and its impact on human health. API value is calculated based on the average concentration of each air pollutant $SO_2$, $NO_2$, CO, $O_3$ and $PM_{10}$. Dominant of air pollutant with the highest concentrations of pollutants are accounted for as that will determine the value of the API. In general, concentrations of $PM_{10}$ are the highest compared to other concentrations and this determines the API readings.* |
| **Indeks UV Suria (UVI)** | Menerangkan tentang sinaran UV di permukaan Bumi. Nilai indeks tersebut mempunyai julat dari sifar ke atas – semakin tinggi nilai indeks, semakin besar potensi berlaku kerosakan pada kulit dan mata, semakin cepat kesan tersebut boleh berlaku. | ***Solar UV Index (UVI)*** | *Describes the UV rays on the Earth's surface. The value of the index has a range from zero upwards - the higher the value of the index, the greater the potential for damage to the skin and eyes and the faster the effect can occur.* |
| **Insinerator** | Relau untuk membakar bahan buangan di bawah keadaan terkawal. | ***Incinerator*** | *Furnace for burning wastes under controlled conditions.* |
| **K** | | | |
| **Kadar mortaliti bayi** | Nisbah bilangan kematian bayi di bawah umur 1 tahun dalam sesuatu tahun kepada jumlah bilangan kelahiran hidup dalam tahun itu (bagi setiap seribu kelahiran hidup). | ***Infant mortality rate*** | *The ratio number of deaths of infants under 1 year of age in a given year to the total number of live births in that year (per thousand live births).* |

| TERMA | PENERANGAN | *TERMS* | *EXPLANATIONS* |
|---|---|---|---|
| **Kawasan tadahan** | Kawasan di mana hujan mengalir ke dalam sungai, tasik atau takungan. | ***Catchment area*** | *The area from which rainfall flows into a river, lake or reservoir.* |
| **Kapasiti pengeluaran** | Keupayaan pengeluaran air bagi loji yang beroperasi sepenuhnya dalam tahun berkenaan. Kapasiti pengeluaran berbeza setiap tahun tertakluk kepada reka bentuk loji. | ***Production capacity*** | *The ability to produce water by fully operated plants in the respective year. The production capacity varies every year according to the design of the plants.* |
| **Karbon Monoksida** | Tidak berwarna, tidak berbau dan gas beracun yang dihasilkan oleh pembakaran bahan api dan fosil yang tidak lengkap. | ***Carbon Monoxide*** | *Colourless, odourless and poisonous gas produced by incomplete fossil fuel combustion.* |
| **Kawasan bandar** | Kawasan yang diwartakan serta kawasan tepubina yang bersempadan dengannya dan gabungan kedua-dua kawasan ini mempunyai penduduk seramai 10,000 atau lebih. Kawasan tepubina didefinisikan sebagai kawasan yang terletak bersebelahan kawasan yang diwartakan dan mempunyai sekurang-kurangnya 60 peratus (berumur 15 tahun dan lebih) yang terlibat dalam aktiviti bukan pertanian. | ***Urban area*** | *Gazetted areas with their adjoining built-up areas which had a combined population of 10,000 or more. Built-up areas were defined as more. Built-up areas were defined as areas contiguous to a gazetted area and had at least 60 per cent of their population (aged 15 years and over) engaged in non-agricultural activities.* |
| **Kawasan perlindungan/ simpanan** | Kawasan tanah dan/ atau laut khususnya bagi perlindungan dan pemuliharaan kepelbagaian biologi, yang berkaitan dengan sumber semula jadi dan diurus melalui perundangan ataupun cara lain yang berkesan. Definisi ini diadaptasi daripada *The International Union for Conservation of Nature* (IUCN). | ***Protected/preserved area*** | *An area of land and/ or sea especially dedicated to the protection and maintenance of biological diversity and of natural and associated cultural resources and managed through legal or other effective means. This definition is adopted by The International Union for Conservation of Nature (IUCN).* |
| **Kemalangan jalan raya** | Kemalangan atau kejadian yang mana kerosakan berlaku ke atas mana-mana orang, harta, kenderaan, struktur atau haiwan dan berlaku di mana-mana jalan awam termasuklah jambatan, terowong, hentian sebelah, jalan bertingkat, jejambat, plaza tol dan sebagainya. | ***Road traffic crash*** | *Accidents or occurrences whereby damage or injury is caused to any person, property, vehicle, structure or animal and occurs in any public road including bridge, tunnels, lay-bye, interchanges, overpasses, toll plazas and so on.* |
| **Kelajuan angin permukaan** | Merujuk kepada laju angin pada ketinggian piawai 10m di atas tanah. | ***Surface wind speed*** | *Refers to the wind speed at a standard altitude of 10m above ground.* |
| **Kepadatan penduduk** | Jumlah bilangan penduduk setiap unit per segi di kawasan muka bumi. | ***Population density*** | *Total number of inhabitants per square unit of surface area.* |

| TERMA | PENERANGAN | *TERMS* | *EXPLANATIONS* |
|---|---|---|---|
| **Kepelbagaian biologi** | Kepelbagaian biologi bermaksud variasi di antara organisma hidup daripada pelbagai sumber termasuk daratan, marin serta ekosistem akuatik lain; ia termasuklah kepelbagaian di dalam peringkat genetik, spesies dan ekosistem. Definisi ini diadaptasi daripada *United Nations Convention on Biological Diversity*. | ***Biological diversity*** | *Biological diversity means the variability among living organisms from various sources including terrestrial, marine and other aquatic ecosystems; this includes diversity at the genetic, species and ecosystem level. This definition is adopted by the United Nations Convention on Biological Diversity.* |
| **Keperluan Oksigen Biokimia ($BOD_5$)** | Ukuran jumlah oksigen terlarut yang diperlukan oleh organisma untuk mengurai bahan organik yang terdapat di dalam air. Biasanya bacaan diambil dalam tempoh 5 hari. | ***Biochemical Oxygen Demand ($BOD_5$)*** | *Dissolved oxygen required by organisms for the aerobic decomposition of organic matter present in water. This measurement is usually taken within 5 days.* |
| **Keperluan Oksigen Kimia (COD)** | Indeks pencemaran air yang digunakan sebagai ukuran kepekatan jisim oksigen yang diperlukan untuk mengurai bahan organik dan bukan organik. | ***Chemical Oxygen Demand (COD)*** | *Index of water pollution measuring the mass concentration of oxygen consumed by the chemical breakdown of organic and inorganic matter.* |
| **Kolera** | Penyakit usus pada umumnya disebabkan oleh pencemaran najis daripada air dan makanan. | ***Cholera*** | *Intestinal disease generally caused by faecal contamination of water and food.* |
| **Kuasa hidro** | Tenaga primer yang disimpulkan tersedia untuk pengeluaran elektrik dan ditunjukkan dari segi konvensional setara dengan bahan api fosil menggunakan kecekapan purata penukaran haba untuk tahun tersebut. | ***Hydropower*** | *Is the inferred primary energy available for electricity production and is shown in terms of conventional fossil fuel equivalent using the average thermal efficiency of conversion for the year.* |
| **Kutipan biji benih** | Biji benih pokok hutan yang dikutip secara terus dari atas pokok. | ***Seeds collections*** | *Seeds of forest trees collected directly from the tree.* |
| **L** | | | |
| **Ladang hutan** | Kawasan yang ditanam dengan pokok atau tumbuh-tumbuhan hutan, sama ada daripada spesies tempatan atau dagang, dengan kaedah tanaman secara terbuka yang luasnya tidak kurang daripada 50 ha. Ladang hutan boleh merangkumi kawasan yang terletak di dalam atau di luar HSK. | ***Forest plantation*** | *Area planted with trees or forest plants, whether from local or foreign species, the method of cultivation as wide open no less than 50 ha. Forest plantations can include areas that are located within or outside the PRF.* |

| TERMA | PENERANGAN | *TERMS* | *EXPLANATIONS* |
|---|---|---|---|
| **Latar belakang** | Stesen yang tidak terpengaruh dengan faktor-faktor pencemaran udara dari industri dan kenderaan bermotor. Stesen ini biasanya ditempatkan di kawasan yang jauh dari punca pencemar dan dijadikan bacaan rujukan bagi kategori stesen yang lain. | ***Background*** | *Stations that is not affected by air pollution factors from industry and motor vehicles. The station is usually located in a remote area of interest and is a reference point for other categories of stations.* |
| **Logam berat** | Logam bertoksik yang digunakan dalam proses industri, sebagai contoh, arsenik, kadmium, kromium, tembaga, plumbum, raksa, nikel dan zink. Ia boleh merosakkan kehidupan tumbuhan dan haiwan pada kepekatan yang rendah dan cenderung untuk berkumpul dalam rantaian makanan. | ***Heavy metals*** | *Potentially toxic metals used in industrial processes, for example, arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc. They may damage plant and animal life at low concentrations and tend to accumulate in the food chain.* |
| **M** | | | |
| **Megakepelbagaian** | Konsep megakepelbagaian melibatkan anggaran jumlah bilangan semua organisma hidup di dalam ekosistem dan ini bermakna sesuatu kawasan itu mempunyai sekurang-kurangnya 60.0 peratus daripada spesis yang diketahui di dunia. Sebahagian besar daripada kepelbagaian tersebut adalah endemisme dan ini menggambarkan keunikan kawasan tersebut. | ***Megadiversity*** | *The concept of megadiversity involves an estimate of the total number of all the organisms in an ecosystem and is represented by an area that comprises at least 60.0 per cent of the world's known species. A major part of diversity is endemism as this reflects the uniqueness of an area.* |
| **N** | | | |
| **Nilai defektif** | Nilai yang diragui atau nilai yang tidak diterima setelah menjalani proses semakan kualiti data. | ***Defective value*** | *A doubtful value or an unacceptable value after undergoing a data quality review process.* |
| **Nilai pH** | Ukuran kepada keasidan untuk nilai alkali dalam cecair. Nilai pH di antara lingkungan 0 ke 7 menunjukkan asid, nilai pH di antara lingkungan 7 ke 14 menunjukkan alkali dan nilai pH 7 menandakan neutral. | ***pH Value*** | *Measure of the acidity or alkalinity of a liquid. A pH value in the range of 0 to 7 indicates acidity, a pH value in the range of 7 to 14 indicates alkalinity and a pH value of 7 signifies neutrality.* |
| **Nitrogen Dioksida ($NO_2$)** | Nitrogen Dioksida terbentuk di persekitaran udara melalui pengoksidaan Nitrogen Monoksida (NO). Gas bertoksik berwarna merah keperangan ini mempunyai bau yang kuat dan tajam. | ***Nitrogen Dioxide ($NO_2$)*** | *Nitrogen Dioxide is formed in the ambient air through the oxidation of Nitrogen Monoxide (NO). This reddish brown toxic gas has a sharp and pungent odour.* |

| TERMA | PENERANGAN | *TERMS* | *EXPLANATIONS* |
|---|---|---|---|
| **O** | | | |
| **Oksigen Terlarut (DO)** | Jumlah gas oksigen ($O_2$) yang berada dalam air, dikira mengikut kandungannya dalam isi padu air (miligram $O_2$ seliter) atau jumlah peratusnya dalam air tepu. | ***Dissolved Oxygen (DO)*** | *Amount of gaseous oxygen ($O_2$) actually present in water expressed in terms either of its presence in the volume of water (milligrams of $O_2$ per litre) or of its share in saturated water (percentage).* |
| **Ozon ($O_3$)** | Gas yang mengeluarkan bau yang tidak menyenangkan, tidak berwarna dan bertoksik yang menyumbang kepada fotokimia asbut (campuran asap dan kabut). $O_3$ terbentuk hasil daripada reaksi kimia antara Sebatian Organik Meruap (VOC) dan Nitrogen Oksida ($NO_x$). Pada lewat tengah hari atau awal petang, lazimnya kepekatan ozon adalah tinggi dan mendominasi bacaan IPU di sesetengah kawasan. Di bawah pengaruh cahaya matahari, $NO_x$ dan VOC yang dilepaskan dari ekzos kenderaan bermotor dan industri ia bertindak balas bagi membentuk ozon di permukaan bumi. | ***Ground Level Ozone ($O_3$)*** | *A pungent, colourless and toxic gas that contributes to photochemical smog. $O_3$ is formed as a result of chemical reaction in the air between Volatile Organic Compounds (VOCs) and Nitrogen Oxide ($NO_x$). By the late afternoon or early evening, usually $O_3$ concentration is high and dominating API readings in some areas. Under the sunlight influence, and reaction between $NO_x$ and VOC that released from motor vehicles exhaust and industrial which form the $O_3$ in the earth's surface. Under the influence of sunlight, nitrogen oxide ($NO_x$) and volatile organic compounds (VOCs) emitted from motor vehicle exhaust and industry reacts to form $O_3$ in the earth's surface.* |
| **P** | | | |
| **Pelepasan** | Pembuangan bahan pencemar ke atmosfera dari punca tetap seperti cerobong asap dan lain-lain, kawasan komersial atau perindustrian dan juga berpunca daripada punca bergerak seperti kenderaan bermotor, lokomotif dan pesawat. | ***Emission*** | *Discharge of pollutants into the atmosphere from stationary sources such as smokestacks, other vents, surface areas of commercial or industrial facilities and mobile sources, for example, motor vehicles, locomotives and aircraft.* |
| **Pemantauan kualiti udara** | Bacaan *standard* dan pemerhatian terhadap udara yang diambil secara berterusan atau kerap yang digunakan sebagai peringatan dan kawalan. | ***Air quality monitoring*** | *Continuous or frequent standardised measurement and observation of the air, often used for warning and control.* |
| **Pencemaran marin** | Pengenalan langsung atau tidak langsung oleh manusia atau tenaga ke dalam alam sekitar marin (termasuk muara), menghasilkan kemusnahan kepada sumber kehidupan, berbahaya kepada kesihatan hidupan, halangan kepada kegiatan marin termasuk memancing, merosakkan kualiti air laut dan mengurangkan keselesaan. | ***Marine pollution*** | *Direct or indirect introduction by humans of substances or energy into the marine environment (including estuaries), resulting in harm to living resources, hazards to human health, hindrances to marine activities including fishing, impairment of the quality of sea water and reduction of amenities.* |

| TERMA | PENERANGAN | *TERMS* | *EXPLANATIONS* |
|---|---|---|---|
| **Pencemaran marin** | Pengenalan langsung atau tidak langsung oleh manusia atau tenaga ke dalam alam sekitar marin (termasuk muara), menghasilkan kemusnahan kepada sumber kehidupan, berbahaya kepada kesihatan hidupan, halangan kepada kegiatan marin termasuk memancing, merosakkan kualiti air laut dan mengurangkan keselesaan. | ***Marine pollution*** | *Direct or indirect introduction by humans of substances or energy into the marine environment (including estuaries), resulting in harm to living resources, hazards to human health, hindrances to marine activities including fishing, impairment of the quality of sea water and reduction of amenities.* |
| **Pencemaran udara** | Kandungan sesuatu gas, cecair atau zarah yang terampai di udara ambien yang boleh menjejaskan kehidupan atau memberi kesan negatif kepada manusia, tumbuh-tumbuhan dan haiwan. | ***Air pollution*** | *Content of a gas, liquid or particles suspended in the ambient air that could affect life or a negative impact on humans, plants and animals.* |
| **Penempatan penduduk** | Konsep penyatuan yang terdiri daripada (a) komponen fizikal tempat berteduh dan infrastruktur dan (b) perkhidmatan yang mana menyokong penyediaan elemen fizikal. Ini boleh dikatakan seperti perkhidmatan komuniti seperti pendidikan, kesihatan, kebudayaan, kebajikan, rekreasi dan pemakanan. | ***Human settlements*** | *Integrative concept that comprises (a) physical components of shelter and infrastructure and (b) services to which the physical elements provide support, that is to say, community services such as education, health, culture, welfare, recreation and nutrition.* |
| **Pengawasan kualiti air** | Bacaan *standard* dan pemerhatian terhadap air yang diambil secara berterusan atau kerap yang digunakan sebagai peringatan dan kawalan. | ***Water quality monitoring*** | *Continuous or frequent standardised measurement and observation of the water often used for warning and control.* |
| **Penyejatan** | Suatu proses yang melibatkan perubahan fasa cecair kepada gas apabila cecair terdedah kepada atmosfera. Dalam meteorologi ia diukur sebagai jumlah sejatan iaitu jumlah air yang disejat daripada tangki sejatan. | ***Evaporation*** | *A process that involves the phase change of a liquid to a gas when the liquid is exposed to the atmosphere. In meteorology, it is measured as the amount of evaporation i.e. the amount of water evaporated from the evaporation tank.* |
| **Penyiasatan migrasi** | Mengumpul maklumat responden di tempat kediaman pada dua titik masa (tarikh tertentu), di mana tempoh antaranya genap satu tahun. Pertukaran lokaliti tempat kediaman pada dua titik masa ini dianggap sebagai migrasi. Penduduk yang bertukar lokaliti tempat kediaman serta selalu merentasi sempadan negeri adalah migran antara negeri. | ***Migration survey*** | *Collects information on respondents' usual place of residence at two specific points of time (different date) which are exactly one year apart. Changes in the usual place of residence locality at these two points in time constitute migration. Population that changes its usual place of residence across state boundaries is known as inter-state migrant.* |

| TERMA | PENERANGAN | *TERMS* | *EXPLANATIONS* |
|---|---|---|---|
| **Pepejal Terampai (SS)** | Pepejal Terampai (SS) berpunca daripada hakisan tanah dan mendapan daripada pembangunan kawasan tanah tinggi dan pembukaan tanah untuk pembalakan dan perlombongan. Ia akan mengakibatkan peningkatan SS dan perubahan kepada kualiti air di dalam lembangan sungai. | ***Suspended Solids*** | *Suspended Solids (SS) is caused by soil erosion and sedimentation from the development in highlands and clearance of land for logging and mining. It is resulted in the increase of SS and affects water quality in the river basins.* |
| **Perangkaan alam sekitar** | Statistik yang menerangkan keadaan dan arah aliran alam sekitar, meliputi media alam sekitar semula jadi (udara/iklim, air, tanah), biota dalam media dan penempatan penduduk. Perangkaan alam sekitar mengukur aktiviti manusia dan kejadian semula jadi yang membawa kesan kepada alam sekitar, kesan daripada aktiviti-aktiviti dan kejadian ini, reaksi masyarakat kepada kesan alam sekitar dan kualiti kesediaan aset semula jadi. Definisi luas termasuk petunjuk alam sekitar, indeks dan perakaunan. | ***Environment statistics*** | *Statistics that describe the state and trends of the environment, covering the media of the natural environment (air/climate, water, land/soil), the biota within the media, and human settlements. Environment statistics are integrative in nature, measuring human activities and natural events that affect the environment, the impacts of these activities and events, social responses to the environmental impacts, and the quality and availability of natural assets. Broad definitions include environmental indicators, indices and accounting.* |
| **Perubahan iklim** | Istilah yang kerap digunakan merujuk kepada kepanasan sejagat berkaitan pelepasan gas rumah kaca hasil kegiatan manusia. | ***Climate change*** | *Term frequently used in reference to global warming due to greenhouse gas emissions from human activities.* |
| **R** | | | |
| **Rangka Kerja Pembangunan Perangkaan Alam Sekitar** | Konsep rangka kerja bagi membantu membangunkan, menyelaras dan menguruskan perangkaan alam sekitar dan perangkaan berkaitan dengan sosial ekonomi dan demografi. Ia dibangunkan oleh *United Nations Statistics Division* dalam tahun 1984 dan ianya berdasarkan kepada prinsip tekanan-tindak balas impak alam sekitar. | ***Framework for the Development of Environment Statistics (FDES)*** | *Conceptual framework that assists in development, coordination and organisation of environment statistics and related socio-economic and demographic statistics. It was developed by the United Nations Statistics Division in 1984 and is based on stress-response principles of environmental impacts.* |
| **S** | | | |
| **Sinaran global** | Jumlah sinaran radiasi elektomagnet yang dipancarkan oleh matahari ke permukaan bumi. | ***Global radiation*** | *The amount of electromagnetic radiation emitted by the sun to the earth's surface.* |

| TERMA | PENERANGAN | *TERMS* | *EXPLANATIONS* |
|---|---|---|---|
| **Sisa** | Aliran bahan pepejal, cecair dan gas, serta tenaga, yang dibuang, dilepaskan atau dikeluarkan oleh pertubuhan dan isi rumah melalui proses pengeluaran, penggunaan atau pengumpulan. | ***Residuals*** | *Flows of solid, liquid and gaseous materials, and energy, discarded, discharged or emitted by establishments and households through production, consumption or accumulation processes.* |
| **Sistem bekas lombong** | Sistem untuk menternak ikan di mana-mana tanah yang pernah (tetapi tidak lagi) diberi atau dikeluarkan pajakan lombong atau sijil lombong di bawah mana-mana undang-undang bertulis mengenai perlombongan. | ***Ex-mining culture system*** | *System of fish culture on any land in respect of which a mining lease or certificate (were once but no longer) granted or issued under any written law relating to mining.* |
| **Sistem kandang** | Sistem yang merupakan suatu kepungan yang dibuat daripada bahan pengadang yang dilekatkan pada tiang yang ditanam ke dasar laut. | ***Pen culture system*** | *System of fish culture in an enclosure made of any screening material attached to poles staked to the seabed.* |
| **Sistem kolam** | Sistem ternakan ikan di dalam kolam. | ***Culture system*** | *System of fish culture in ponds.* |
| **Sistem sangkar** | Sistem untuk menternak ikan di dalam suatu kepungan yang dibuat daripada apa-apa bahan saringan yang diikat pada struktur yang dilabuhkan pada dasar perairan sungai atau mana-mana tempat di darat. | ***Cage culture system*** | *System of fish culture in an enclosure on whatever shape or size made of any screening material and attached to floating structures which are anchored to the sea-bed.* |
| **Sistem tangki** | Sistem ternakan ikan di dalam tangki di atas tanah. | ***Tank culture system*** | *System of fish culture in tanks on land.* |
| **Standard kualiti udara** | Kepekatan sesuatu bahan cemar yang dibenarkan dalam atmosfera oleh undang-undang untuk meminimumkan kesan mudarat. | ***Air quality standards*** | *Levels of air pollutants prescribed by regulations that may not be exceeded during a specified time in a defined area.* |
| **Subbandar** | Stesen pengawasan kualiti udara yang terletak di kawasan pinggir bandar. | ***Suburban*** | *Air quality monitoring stations located in the suburban areas.* |
| **Sulfur Dioksida ($SO_2$)** | Berat, tajam, gas tidak berwarna terbentuk terutamanya oleh pembakaran bahan api fosil. Ia adalah berbahaya kepada manusia dan tumbuh-tumbuhan dan menyumbang kepada keasidan dalam hujan. | ***Sulphur Dioxide ($SO_2$)*** | *Heavy, pungent, colourless gas formed primarily by the combustion of fossil fuels. It is harmful to human beings and vegetation and contributes to the acidity in precipitation.* |

| TERMA | PENERANGAN | *TERMS* | *EXPLANATIONS* |
|---|---|---|---|
| **T** | | | |
| **Taman Laut** | Kawasan perairan laut yang dizonkan sejauh dua batu nautika dari tikas air surut terendah, kecuali Pulau Kapas di Terengganu, Pulau Kuraman, Pulau Rusukan Besar dan Pulau Rusukan Kecil di W.P. Labuan yang dizonkan sejauh satu batu nautika dari tikas air surut terendah. Taman Laut ditubuhkan untuk melindungi dan memulihara pelbagai habitat dan hidupan marin akuatik. | ***Marine Park*** | *Sea zoned area for a distance of two nautical miles from the lowest sea level, except in Kapas Island in Terengganu, Kuraman Island, Rusukan Besar Island and Rusukan Kecil Island in W.P. Labuan. These areas are zoned for a distance of one nautical mile from the lowest sea level. Marine Park is established to protect and conserve various habitats and aquatic marine life.* |
| **Tanah Bencah-Ramsar** | Kawasan yang berpaya, fen, tanah gambut atau berair samada semula jadi atau buatan manusia, kekal atau sementara, mengandungi air yang tidak mengalir, mengalir, air bersih, air tawar atau masin termasuk kawasan perairan laut, di mana dalamannya tidak melebihi enam meter. | ***Wetland-Ramsar*** | *Areas of marshes, fen, peatland or water, whether natural or artificial, permanent or temporary, static water, flowing, fresh, brackish or salt, including areas of marine water, the depth of which at low tide does not exceed six metres.* |
| **Tanah bencah** | Kawasan dari lapisan tanah rendah yang mana aras air bumi yang berada atau berhampiran dengan permukaan tanah pada kebanyakan masa. Tanah bencah termasuk semua tanah berpaya, tanah berlumpur, fen dan muara. | ***Wetland*** | *Area of low-lying land where the water table is at or near the surface most of the time. Wetlands include swamps, bogs, fens, marshes and estuaries.* |
| **Tanah berhutan** | Tanah yang merangkumi lebih daripada 0.5 hektar. Pokok-pokok mencapai tinggi sekurang-kurangnya lima meter dengan litupan kanopi melebihi 10 peratus, atau pokok yang mampu untuk mencapai tahap in-situ (FAO 1998; FRA 2000). Ia tidak termasuk tanah di bawah penggunaan tanah pertanian atau bandar (dirian pokok di kawasan pertanian, taman dan sebagainya). Keluasan kawasan berhutan ini dibahagikan kepada Hutan Simpanan Kekal (HSK), Hutan Tanah Kerajaan (HTK), Hutan Hidupan Liar di luar kawasan HSK, lain-lain Rizab Berhutan dan Tanah Berimilik. | ***Forested land*** | *A land area of more than 0.5 hectares. The trees should be able to reach a minimum height of five metres with a tree canopy cover of more than 10 per cent, or the trees that are capable to reach in-situ level (FAO 1998: FRA 2000). It does not include land under agricultural or urban land use (stand of trees in agricultural areas, parks, etc.). Forested land is divided into permanent forest reserve (PRF), forest land government (FLG), forest wildlife outside the (PRF), others forested reserve and alienated land. (FAO 1998; FRA 2000)* |
| **Tanaman** | Tanaman merujuk kepada tumbuhan atau hasil pertanian yang ditanam untuk makanan atau keperluan ekonomi lain seperti pakaian atau makanan ternakan. | ***Crops*** | *Crops refer to plants or agricultural produce grown for food or other economic purposes, such as clothes or livestock fodder.* |

| TERMA | PENERANGAN | *TERMS* | *EXPLANATIONS* |
|---|---|---|---|
| **Tanaman buluh** | Buluh digunakan secara meluas dalam industri pembuatan perabot, kraftangan, bekas barangan, tikar, pulpa, kertas, bahan bakar, pembinaan dan peralatan rumah. | ***Bamboo plantation*** | *Bamboo is a widely used in the furniture manufacturing industry, handicrafts, container products, matting, pulp, paper, fuel, and construction as well as home appliances.* |
| **Tanaman mengaya** | Merupakan suatu rawatan pemulihan hutan ke atas kawasan hutan miskin dan kawasan lapang yang dilaksanakan ke atas kawasan di dalam HSK yang telah diusahasil bagi membantu meningkatkan isi kandungan hutan tersebut supaya mencapai tahap yang dikehendaki. | ***Enrichment planting*** | *Forest restoration treatments on poor forest areas and open spaces that are performed on the areas in PRF which has been harvested to help improve the content of the forest to reach the desired level.* |
| **Tanaman rotan** | Salah satu hasil hutan bukan kayu utama. Bertujuan untuk meningkatkan stok tumbuhan dalam kawasan HSK yang sesuai bagi memastikan pengeluaran sumber ini secara berkekalan untuk menampung keperluan industri perabot rotan tempatan. | ***Rattan plantation*** | *One of the main non-timber forest products. The plantation is to increase the stock of this plant in the PRF appropriate to ensure sustainable production of these resources to meet the needs of the local rattan furniture industry.* |
| **Tanaman tumbuhan ubatan** | Spesies tumbuhan yang mempunyai nilai perubatan dan ditanam secara ladang. | ***Planting of medicinal plants*** | *Species of plants that have medicinal value and cultivated fields.* |
| **Tapak pelupusan** | Pemindahan terakhir bahan sisa di dalam atau di atas tanah yang dikawal atau tidak dikawal mengikut cara kebersihan yang berbeza, perlindungan alam sekitar dan keperluan keselamatan yang lain. | ***Landfill*** | *Final replacement of waste in or on the land in a controlled or uncontrolled way according to different sanitary, environmental protection and other safety requirements.* |
| **Tapak pelupusan sanitari** | Kaedah untuk melupuskan sisa pepejal di atas tanah tanpa menimbulkan gangguan atau bahaya kepada kesihatan awam dan alam sekitar. Berdasarkan prinsip kejuruteraan, sisa pepejal dihadkan kepada kawasan kecil, dikurangkan kepada jumlah yang ter kecil dan ditutup dengan lapisan tanah pada penghujung waktu operasi (ditutup setiap hari), atau pada jangka masa yang lebih kerap mengikut keperluan. | ***Sanitary landfill*** | *A method of disposing of solid wastes on land without creating nuisances or hazards to public health or the environment. Using the principles of engineering, the solid waste is confined to the smallest practical area, reduced to the smallest practical volume and covered with a layer of earth at the conclusion of operation (daily cover), or at more frequent intervals as may be necessary.* |
| **Tapak semaian** | Menghasilkan anak benih dan anak pokok untuk digunakan bagi projek-projek penghutanan semula, penyelidikan, perhutanan bandar dan aktiviti landskap. | ***Nursery*** | *Produce seedlings and saplings to be used for reforestation projects, research, urban forestry and landscape activities.* |

| TERMA | PENERANGAN | *TERMS* | *EXPLANATIONS* |
|---|---|---|---|
| **Tekanan aras laut** | Tekanan udara yang diukur berdasarkan jarak ketinggian dari paras purata aras laut (mengikut *ICAO Standard Atmosphere).* | ***Sea level pressure*** | *The air pressure measured based on the altitude distance from the mean sea level (according to the ICAO Standard Atmosphere).* |
| **Tidak diperoleh** | Tiada pencerapan dilaksanakan. | ***Not available*** | *No observations are performed* |
| **Topografi** | Bentuk fizikal kawasan permukaan, termasuk muka bumi atau ketinggian relatif dan kedudukan bentuk muka bumi buatan manusia dan semula jadi. | ***Topography*** | *Physical feature of a surface area, including its relief or relative elevations, and the position of human-made and natural features.* |
| **V** | | | |
| **Viral Hepatitis A** | Penyakit akut biasanya termasuk demam, dedar, keletihan melampau, anoreksia, loya, jaundis akut dan kuadran atas kanan abdomen dengan pertambahan lebihan alanine aminotransferase melebihi 2.5 kali kadar biasa. | ***Viral Hepatitis A*** | *Acute illness typically including fever, malaise, extreme fatigue, anorexia, nausea, acute jaundice and right upper quadrant of abdomen tenderness with raised alanine aminotransferase more than 2.5 times normal rate.* |

**PENERBITAN INI BOLEH JUGA DIPEROLEH DI JABATAN PERANGKAAN NEGERI SEPERTI BERIKUT:**

*THIS PUBLICATION IS ALSO AVAILABLE AT THE FOLLOWING STATES DEPARTMENT OF STATISTICS:*


Pengarah,
Jabatan Perangkaan Malaysia Negeri Johor,
Tingkat 14, Menara Tabung Haji,
Jalan Air Molek,
80000 Johor Bahru, Johor.
Tel : 07 - 225 3700
Faks : 07 - 224 9972
E-mel : jpjohor@stats.gov.my

Pengarah,
Jabatan Perangkaan Malaysia Negeri Perak,
Tingkat 3, Blok A, Bangunan Persekutuan Ipoh,
Jalan Dato' Seri Ahmad Said (Greentown)
30450 Ipoh, Perak.
Tel : 05 - 255 4963
Faks : 05 - 255 1073
E-mel : jpperak@stats.gov.my

Pengarah,
Jabatan Perangkaan Malaysia Negeri Kedah,
Aras 1, Zon C, Wisma Persekutuan,
Pusat Pentadbiran Kerajaan Persekutuan,
Bandar Muadzam Shah,
06550 Anak Bukit, Alor Setar, Kedah.
Tel : 04 - 700 1240
Faks : 04 - 733 8412
E-mel : jpkedah@stats.gov.my

Pengarah,
Jabatan Perangkaan Malaysia Negeri Perlis,
26B, Aras 2,
KPARC
01000 Kangar,
Perlis.
Tel : 04 - 976 7381
Faks : 04 - 976 8950
E-mel : jpperlis@stats.gov.my

Pengarah,
Jabatan Perangkaan Malaysia Negeri Kelantan,
Tingkat 8, Bangunan Persekutuan,
Jalan Bayam,
15514 Kota Bharu, Kelantan.
Tel : 09 - 7419449
Faks : 09 - 7482142
E-mel : jpkelantan@stats.gov.my

Pengarah,
Jabatan Perangkaan Malaysia Negeri Selangor,
Tingkat 9, Bangunan Darul Ehsan,
Jalan Indah, Seksyen 14,
40000 Shah Alam, Selangor.
Tel : 03 - 5515 0200
Faks : 03 - 5518 0408
E-mel : jpselangor@stats.gov.my

Pengarah,
Jabatan Perangkaan Malaysia Negeri Melaka,
Terengganu, Aras 7 & 8, Wisma Persekutuan,
Jalan MITC, Hang Tuah Jaya,
75450 Ayer Keroh, Melaka.
Tel : 06 - 252 2725
Faks : 06 - 252 2711
E-mel : jpmelaka@stats.gov.my

Pengarah,
Jabatan Perangkaan Malaysia Negeri
Tingkat 9, Wisma Persekutuan,
Jalan Sultan Ismail,
20200 Kuala Terengganu, Terengganu.
Tel : 09 - 622 3062
Faks : 09 - 622 9659
E-mel : jpterengganu@stats.gov.my

Pengarah,
Jabatan Perangkaan Malaysia Negeri Sembilan,
Tingkat 12, Wisma Persekutuan,
Jalan Dato' Abdul Kadir,
70000 Seremban, Negeri Sembilan.
Tel : 06 - 765 5000
Faks : 06 - 765 5002
E-mel : jpnsembilan@stats.gov.my

Pengarah,
Jabatan Perangkaan Malaysia Negeri Sabah,
Tingkat 1-3, Blok C, Kompleks Pentadbiran
Kerajaan Persekutuan Sabah, Jalan UMS,
Beg Berkunci No. 2046, 88999 Kota Kinabalu, Sabah.
Tel : 088 - 484 602
Faks : 088 - 484 659
E-mel : jpsabah@stats.gov.my

Pengarah,
Jabatan Perangkaan Malaysia Negeri Pahang,
Tingkat 7, Bangunan Persekutuan,
Jalan Gambut,
25000 Kuantan, Pahang.
Tel : 09 - 516 3931/7
Faks : 09 - 514 4636
E-mel : jppahang@stats.gov.my

Pengarah,
Jabatan Perangkaan Malaysia Negeri Sarawak,
Tingkat 7 & 8, Bangunan Tun Datuk Patinggi
Tuanku Haji Bujang, Jalan Simpang Tiga,
93514 Kuching, Sarawak.
Tel : 082 - 240 287
Faks : 082 - 242 609
E-mel : jpsarawak@stats.gov.my

Pengarah,
Jabatan Perangkaan Malaysia Negeri Pulau Pinang,
Persekutuan, Tingkat 6, Bangunan Persekutuan,
10400, Jalan Anson,
Pulau Pinang.
Tel : 04 - 226 6244
Faks : 04 - 229 9499
E-mel : jpppinang@stats.gov.my

Pengarah,
Jabatan Perangkaan Malaysia Wilayah
Tingkat 14 & 15, Wisma FGV,
Jalan Raja Laut,
50350 Kuala Lumpur.
Tel : 03 - 2267 2400
Faks : 03 - 2274 5075
E-mel : jpwpkl@stats.gov.my

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