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JABATAN PERANGKAAN MALAYSIA

STATISTIK ALAM SEKITAR

ENVIRONMENT STATISTICS

2022

KELANTAN

JABATAN PERANGKAAN MALAYSIA
DEPARTMENT OF STATISTICS MALAYSIA

JABATAN PERANGKAAN MALAYSIA

STATISTIK ALAM SEKITAR
ENVIRONMENT STATISTICS
KELANTAN 2022

Pemakluman

Jabatan Perangkaan Malaysia (DOSM) sedang menjalankan Survei Pendapatan, Perbelanjaan Isi Rumah dan Kemudahan Asas (HIES/BA) 2022 bermula dari 1 Januari 2022 sehingga 31 Disember 2022. DOSM amat menghargai kerjasama daripada responden yang terpilih untuk memberikan maklumat kepada DOSM serta menjayakan survei ini. Sila layari www.dosm.gov.my untuk maklumat lanjut.

Penerbitan statistik ekonomi dan sosial iaitu PocketStats yang mengandungi statistik suku tahunan dan tahunan boleh diperoleh dari portal DOSM atau melalui pautan https://bit.ly/PocketStats_2022.

Dimaklumkan bahawa Kerajaan Malaysia telah mengisytiharkan Hari Statistik Negara (MyStats Day) pada 20 Oktober setiap tahun. Tema sambutan MyStats Day adalah *"Connecting the World with Data We Can Trust".*

Announcement

The Department of Statistics Malaysia (DOSM) is conducting the Household Income, Expenditure and Basic Amenities Survey (HIES/BA) 2022 from 1st January 2022 until 31st December 2022. DOSM greatly appreciates the cooperation given by selected respondents by sharing their information with DOSM and making the survey a success. Please visit www.dosm.gov.my for more information.

Economic and social statistics publication namely PocketStats which contain quarterly and annual statistics can be obtained from the DOSM portal or via the link https://bit.ly/PocketStats_2022.

Please be informed that the Government of Malaysia has declared National Statistics Day (MyStats Day) on October 20 each year. MyStats Day theme is "Connecting the World with Data We Can Trust".

JABATAN PERANGKAAN MALAYSIA

DEPARTMENT OF STATISTICS MALAYSIA

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KATA PENGANTAR

Statistik Alam Sekitar, 2022 memaparkan statistik alam sekitar negeri Kelantan 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 2022

PREFACE

Environment Statistics, 2022 presents the environment statistics of Kelantan 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 articles 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 2022

KANDUNGAN
CONTENTS

Jadual *Table* | **Muka Surat** *Page*

Komponen 1 Keadaan dan Kualiti Alam Sekitar
Component *Environmental Conditions and Quality*

Jadual *Table* — **Muka Surat** *Page*

Jadual *Table* | **Muka Surat** *Page*

Komponen 3 Sisa *Component 3 Residuals*

Komponen 4 Kejadian Ekstrem dan Bencana *Component 4 Extreme Events and Disasters*

Jadual *Table* | **Muka Surat** *Page*

Komponen 5 Penempatan Penduduk dan Kesihatan Persekitaran
Component 5 Human Settlements and Environmental Health

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

INFOGRAFIK
INFOGRAPHICS

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STATISTIK ALAM SEKITAR 2022

KELANTAN

Penduduk ('000)

2022P: 1,829.3
2021: 1,812.3

Purata suhu (°C)

2021: 23.1-32.4
2020: 23.5-32.9

Hujan (mm)

2021: 2,527.6-3,065.8
2020: 2,776.4-3,808.0

Kawasan berhutan (hektar)

2018: 810,415
2017: 810,415

Keluasan hutan yang dilesenkan untuk pengusahasilan (hektar)

2020: 15,815
2019: 20,196

Bilangan kes demam denggi

2021: 223
2020: 3,881

Pendaratan ikan laut ('000 tan metrik)

2021: 58.3
2020:73.6

Pengeluaran kayu balak (meter padu)

2021: 641,337
2020: 584,701

Kemalangan jalan raya

2021: 7,982
2020: 9,752

Buangan terjadual (tan metrik)

2021: 6,949
2020: 12,650

Pengeluaran kayu gergaji (meter padu)

2021: 254,655
2020: 287,457

Kejadian banjir

2021: 29
2020: 19

Buangan klinikal (tan metrik)

2021: 1,857.4
2020: 1,377.4

Pengeluaran papan lapis (meter padu)

2021: 8,474
2020: 20,783

Kejadian kebakaran (kes)

2021: 1,247
2020: 1,559

Nota:
p: awalan

Sumber: Statistik Alam Sekitar, Kelantan, 2022
Jabatan Perangkaan Malaysia (DOSM)

ENVIRONMENT STATISTICS 2022

KELANTAN

Population ('000)

2022p: 1,829.3
2021: 1,812.3

Mean temperature (°C)

2021: 23.1-32.4
2020: 23.5-32.9

Rainfall (mm)

2021: 2,527.6-3,065.8
2020: 2,776.4-3,808.0

Forested Areas (hectares)

2018: 810,415
2017: 810,415

Forest area licensed for harvesting (hectares)

2020: 15,815
2019: 20,196

Number of dengue fever cases

2021: 223
2020: 3,881

Landing of marine fish ('000 metric tonnes)

2021: 58.3
2020:73.6

Logs production (cubic metres)

2021: 641,337
2020: 584,701

Road accidents

2021: 7,982
2020: 9,752

Scheduled wastes (metric tonnes)

2021: 6,949
2020: 12,650

Sawn timber production (cubic metres)

2021: 254,655
2020: 287,457

Flood incidents

2021: 29
2020: 19

Clinical wastes (metric tonnes)

2021: 1,857.4
2020: 1,377.4

Plywood production (cubic metres)

2021: 8,474
2020: 20,783

Fire Incidents (cases)

2021: 1,247
2020: 1,559

Notes:
p: preliminary

Source: Environment Statistics, Kelantan, 2022
Department of Statistics Malaysia (DOSM)

RINGKASAN PENEMUAN
SUMMARY OF FINDINGS

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PENGENALAN

Pandemik COVID-19 telah memberi kesan sama ada kepada ekonomi mahupun kepada alam sekitar seluruh dunia. Malaysia masih lagi mendepani cabaran dengan pandemik COVID-19 di mana jumlah kes tertinggi dilaporkan pada 2021.

Situasi ini telah mengakibatkan kerajaan melaksanakan kembali Perintah Kawalan Pergerakan (PKP) dan Perintah Kawalan Pergerakan Pemulihan (PKPP). Seterusnya, Perintah Kawalan Pergerakan Bersyarat (PKPB) dilaksanakan apabila kes menunjukkan trend penurunan.

Pada pertengahan Jun 2021, kerajaan telah memperkenalkan Pelan Pemulihan Negara (PPN) melalui empat fasa untuk menyokong negara dalam menangani isu COVID-19 dan pada masa yang sama untuk memulihkan ekonomi kesan dari pandemik ini.

Susulan dari pelaksanaan PPN, Keluaran Dalam Negeri Kasar (KDNK) Kelantan pada harga malar 2015 melonjak 2.4 peratus (2022: -1.2%) kepada RM25.8 bilion (2020: RM25.2 bilion) pada 2021. KDNK Kelantan menyumbang 1.9 peratus kepada KDNK Malaysia. Manakala, KDNK per kapita pada harga semasa adalah RM15,584 (2020: RM14,951). **[Paparan 1.1]**

Apabila industri dibenarkan untuk beroperasi sepenuhnya, pembebasan bahan pencemar ke udara juga meningkat. Selain itu, beberapa kejadian bencana alam seperti banjir yang telah berlaku pada 2021 di beberapa buah negeri telah memberi kesan terhadap alam sekitar.

Paparan 1.1: Ringkasan Ekonomi Negeri Kelantan, 2020 dan 2021

	2020[e]	2021[p]
KDNK pada harga malar 2015	RM25.2 bilion	RM25.8 bilion
Perubahan peratusan tahunan	-1.2%	2.4%
Peratusan sumbangan kepada KDNK	1.9%	1.9%
KDNK per kapita pada harga semasa	RM14,951	RM15,584

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 3.**

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_{10} dalam udara di Kelantan kembali menunjukkan peningkatan selepas pelaksanaan PKP 3.0 dan Pelan Pemulihan Negara (PPN) yang mula diperkenalkan pada 29 Jun 2021 berbanding tempoh yang sama pada 2020. Stesen Kota Bharu menunjukkan peningkatan dan stesen Tanah Merah menunjukkan penurunan PM_{10} pada tahun 2021.

Manakala, trend purata tahunan kepekatan $PM_{2.5}$ dalam udara di Kelantan pada 2021 mencatatkan peningkatan di stesen Kota Bharu dan penurunan di stesen Tanah Merah berbanding 2020.

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 (NO_x). VOC dan NO_x ini dihasilkan oleh punca kenderaan bermotor dan industri.

Trend purata tahunan kepekatan O_3 dalam udara meningkat sepanjang pelaksanaan PKP 3.0 dan PPN. Secara amnya, bacaan O_3 pada 2021 adalah lebih tinggi berbanding 2020. Ini disebabkan pembukaan 11 kegiatan ekonomi di bawah Fasa 1 PPN.

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 2021 menunjukkan penurunan di stesen Kota Bharu berbanding 2020 disebabkan kawalan pergerakan rentas negeri dan bekerja dari rumah yang secara tidak langsung telah mengurangkan penggunaan kenderaan. Namun begitu, pembukaan sektor ekonomi serta kebenaran rentas negeri menyebabkan peningkatan kepekatan CO.

Sulfur Dioksida (SO_2)

SO_2 adalah sejenis gas reaktif yang mudah larut dalam air, tidak berwarna dan mempunyai bau yang tidak menyenangkan. Pendedahan yang berlebihan terhadap kepekatan tinggi SO_2 di udara menyebabkan kerosakan sistem pernafasan dan komplikasi kardiovaskular.

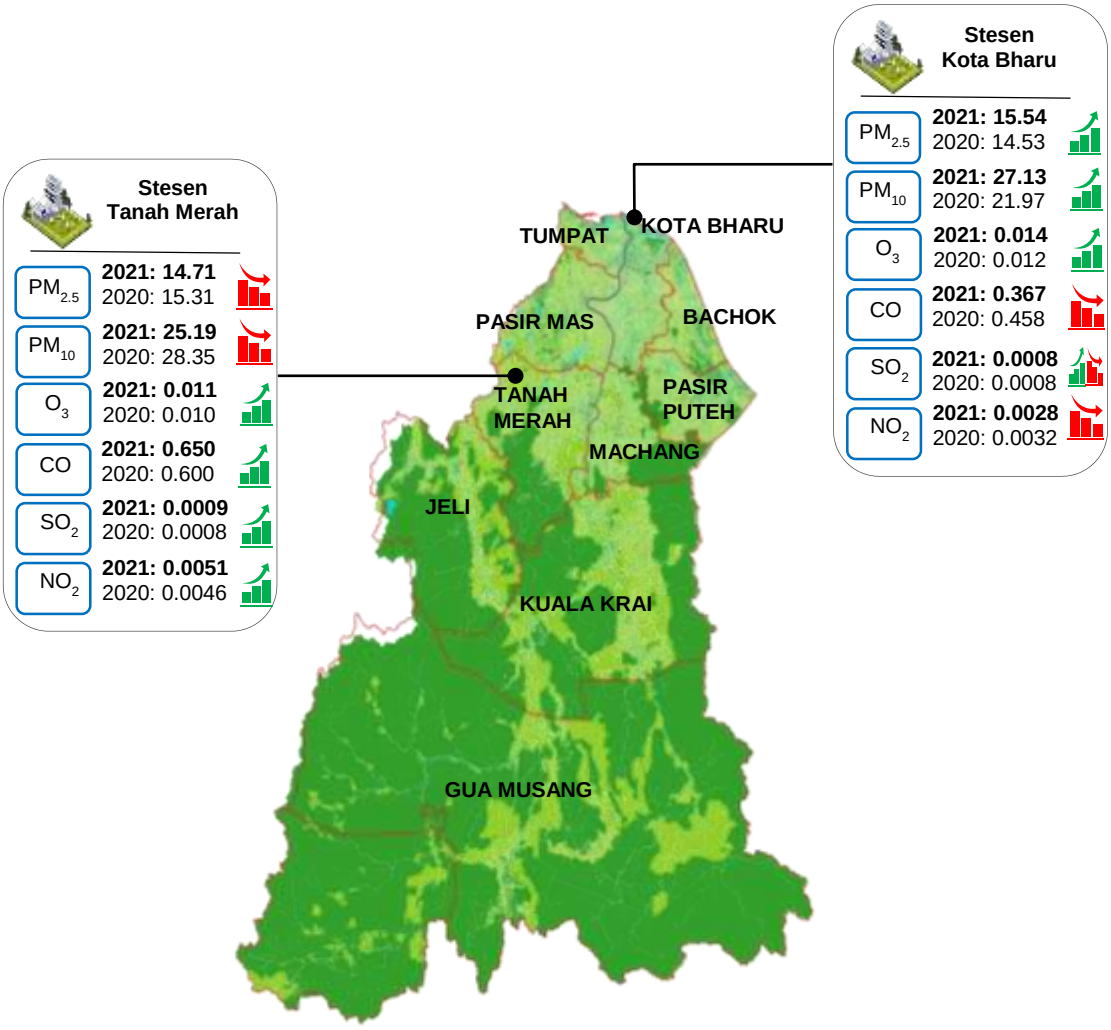
Trend purata tahunan kepekatan SO_2 pada 2021 meningkat berbanding 2020 kecuali di stesen Kota Bharu.

Nitrogen Dioksida (NO_2)

NO_2 terbentuk di persekitaran udara melalui pengoksidaan Nitrogen Dioksida (NO_2). Gas bertoksik ini berwarna merah keperangan dan mempunyai bau yang kuat dan tajam.

Trend purata tahunan kepekatan NO_2 dalam udara pada tahun 2021 menunjukkan peningkatan di stesen Tanah Merah berbanding 2020. **[Paparan 1.2]**

Paparan 1.2: Ringkasan statistik bahan pencemar udara mengikut stesen, Kelantan, 2020 dan 2021



Kenaikan Penurunan Kekal

Sumber: Jabatan Alam Sekitar

Petunjuk:

$PM_{2.5}$	Habuk Halus Diameter 2.5 mikron (µg/m³)	CO	Karbon Monoksida (ppm)
PM_{10}	Habuk Halus Diameter 10 mikron (µg/m³)	SO_2	Sulfur Dioksida (ppm)
O_3	Ozon Permukaan Bumi (ppm)	NO_2	Nitrogen Dioksida (ppm)

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.

Kelantan mempunyai tiga stesen meteorologi yang digunakan untuk memantau keadaan cuaca secara berterusan dan menyediakan data meteorologi sebagai input untuk ramalan cuaca. Stesen-stesen tersebut adalah Gong Kedak, Kota Bharu dan Kuala Krai.

Purata suhu

Stesen Kuala Krai mencatatkan purata suhu tertinggi iaitu 32.4°C, menurun 0.5°C berbanding 32.9°C pada 2020. Stesen Kuala Krai juga merekodkan purata suhu terendah iaitu 23.1°C berbanding yang direkodkan pada 2020 iaitu 23.5°C.

Taburan hujan

Stesen Gong Kedak merekodkan hujan tahunan tertinggi pada 2021 iaitu 3,065.8 mm berbanding tahun 2020 (3,808.0 mm). Namun begitu, stesen Kota Bharu pula mencatatkan hujan tahunan terendah iaitu 2,527.6 mm pada 2021 berbanding tahun sebelumnya (2,9848.4 mm).

Purata kelembapan relatif

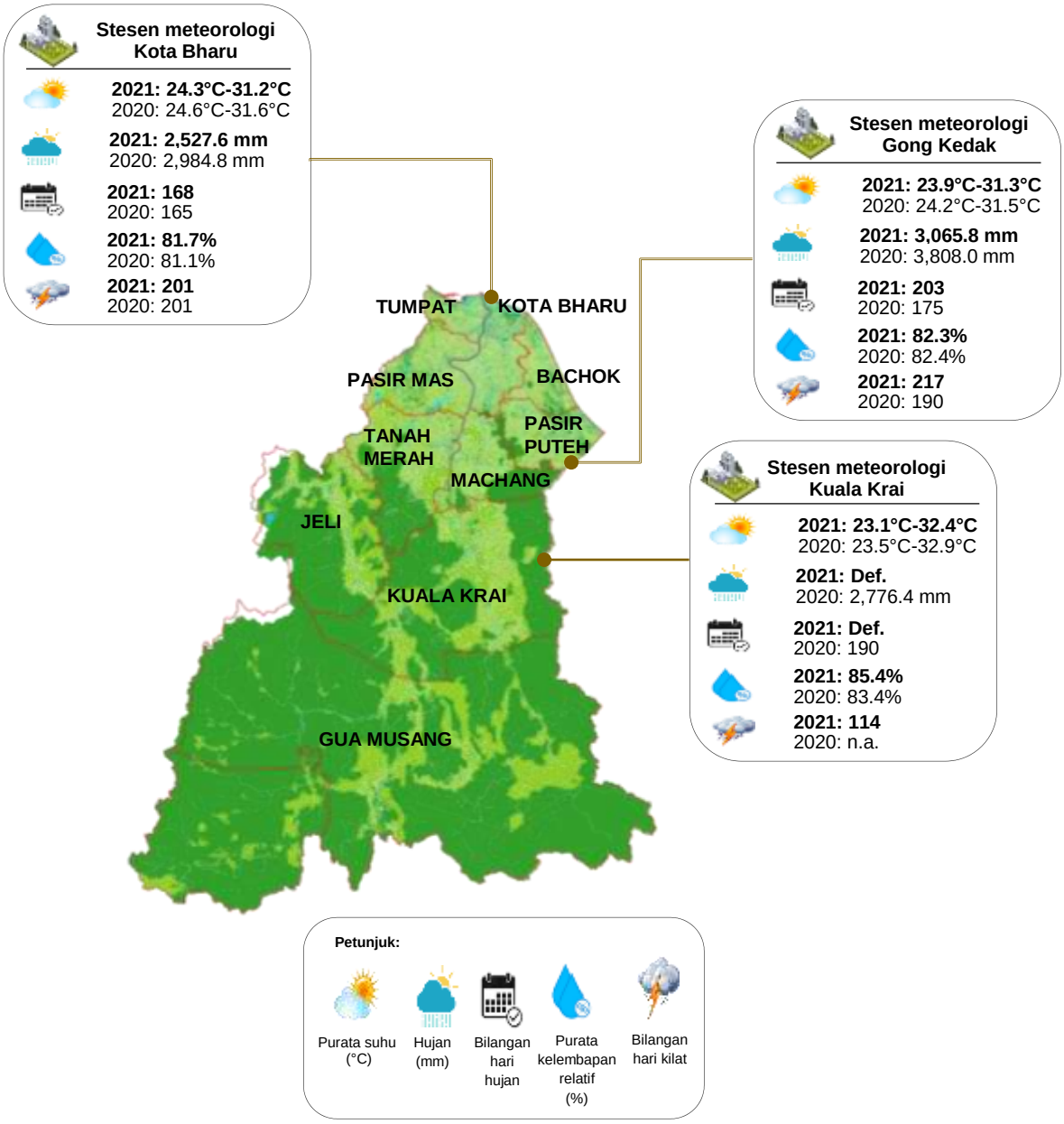
Purata kelembapan relatif di Kelantan adalah di antara 81.7 peratus (Kota Bharu) dan 85.4 peratus (Kuala Krai) pada 2021. Walau bagaimanapun, bacaan ini meningkat berbanding 2020 iaitu antara 81.1 peratus (Kota Bharu) dan 83.4 peratus (Kuala Krai).

Bilangan hari kilat

Stesen Gong Kedak mencatatkan bilangan hari kilat tertinggi dengan 217 hari. Manakala, stesen Kuala Krai pula mencatatkan bilangan hari kilat terendah iaitu 114 hari pada 2021.

[Paparan 1.3]

Paparan 1.3: Ringkasan statistik iklim di stesen meteorologi, Kelantan, 2020 dan 2021



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 pembakaran bahan api bagi tujuan pemanasan, pengangkutan, penjanaan kuasa dan lain-lain.

Indeks Pencemaran Udara

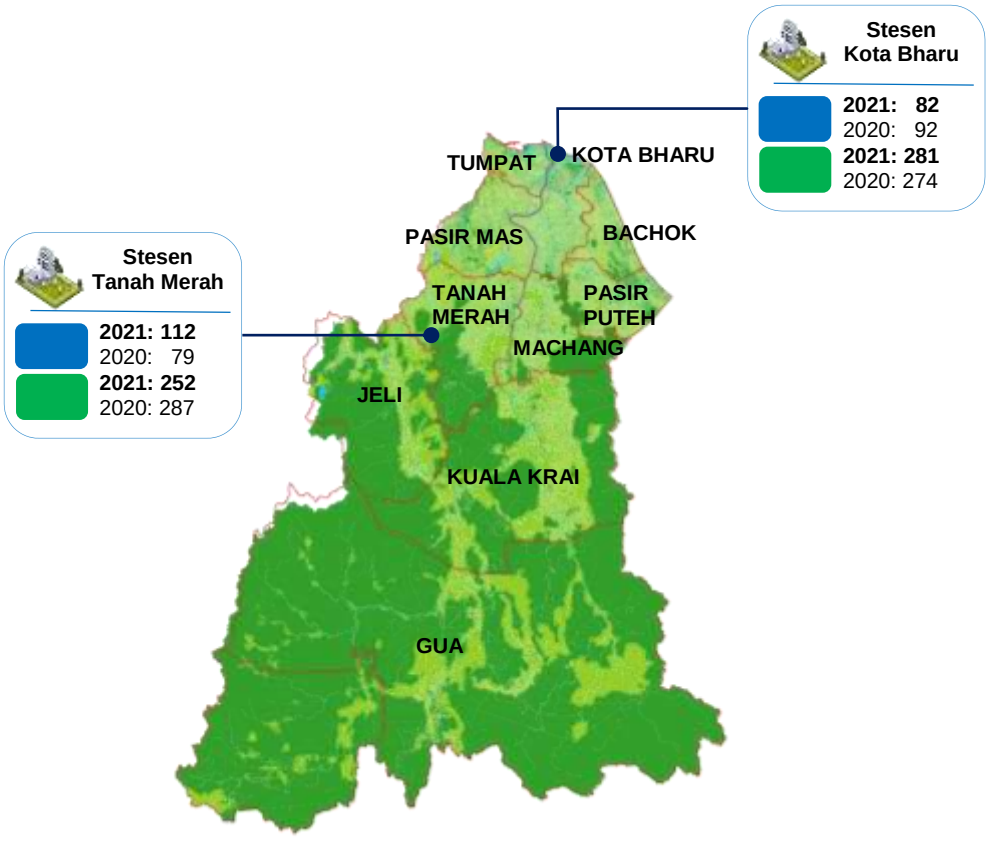
Jabatan Alam Sekitar (JAS) memantau kualiti udara negara melalui 65 stesen pengawasan yang ditempatkan di seluruh negara bagi mengawasi dan mengesan sebarang perubahan kualiti udara yang boleh memberi kesan negatif kepada kesihatan manusia dan alam sekitar. Status kualiti udara di Malaysia dilaporkan 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 ($PM_{2.5}$).

Semasa pelaksanaan PKP, stesen Tanah Merah mencatatkan bilangan hari tertinggi (112 hari) dengan kualiti udara "baik" berbanding 79 hari pada 2020.

Sementara itu, stesen Kota Bahru mencatatkan 82 hari kualiti udara "baik" (2020: 92 hari). 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]**

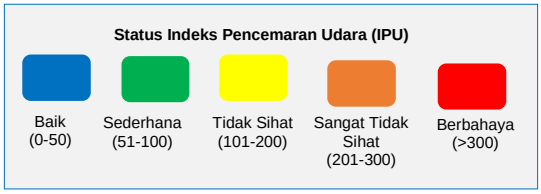
Paparan 1.4: Status kualiti udara[1] mengikut stesen, Kelantan, 2020 dan 2021



Unit pengukuran: bilangan hari

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

Sumber: Jabatan Alam Sekitar



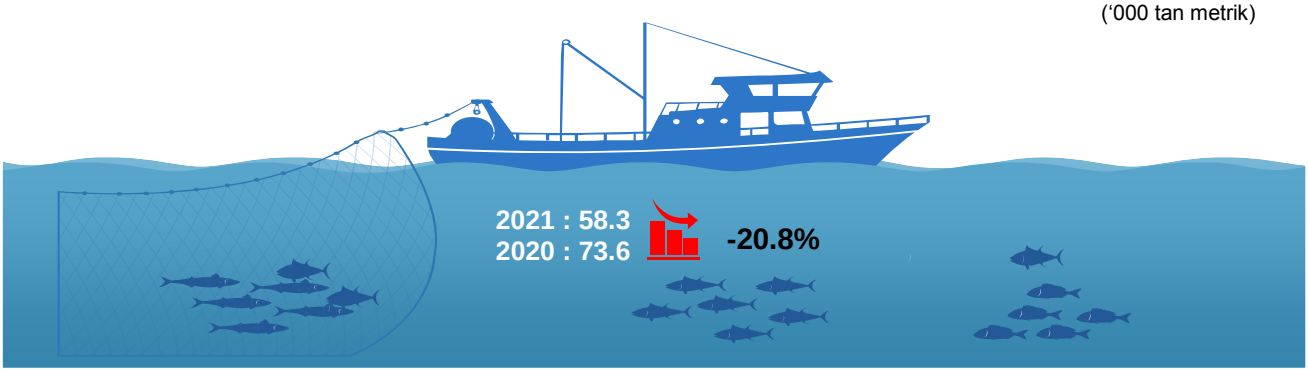
D. Sumber Biologi

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 2021 ialah 58.3 ribu tan metrik, menurun 20.8 peratus berbanding 73.6 ribu tan metrik pada 2020. **[Paparan 1.5]**

Paparan 1.5: Pendaratan ikan laut, Kelantan, 2020 dan 2021

('000 tan metrik)



Kadar pertumbuhan (%)

Sumber: Jabatan Perikanan Malaysia

E. 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.

Pandemik COVID-19 memberi kesan secara langsung ke atas buangan klinikal disebabkan penggunaan peralatan perlindungan diri (PPE) dan peralatan ujian COVID-19 dalam pengendalian pesakit COVID-19 di kemudahan kesihatan dan pusat kuarantin. Kelantan mencatatkan 1,857.4 tan metrik buangan klinikal pada 2021 berbanding 1,377.4 tan metrik yang direkodkan pada 2020. **[Paparan 1.6]**

Paparan 1.6: Kuantiti buangan klinikal, Kelantan, 2020 dan 2021

(Tan metrik)

Buangan klinikal

2021: 1,857.4
2020: 1,377.4

34.8%

Kadar pertumbuhan (%)

Sumber: Jabatan Alam Sekitar

INTRODUCTION

The COVID-19 pandemic has affected both the economy and the environment around the world. Malaysia is still facing challenges with the COVID-19 pandemic where the highest number of cases was reported in 2021.

This situation has resulted in the government re-implementing the Movement Control Order (MCO) and the Recovery Movement Control Order (RMCO). The Conditional Movement Control Order (CMCO) was then implemented when the cases showed a decreasing trend.

In mid-June 2021, the goverment introduced the National Recovery Plan (NRP) through four phases to support the country in dealing with the COVID-19 issue and at the same time to revived the economy.

Following the implementation of NRP, Kelantan's Gross Domestic Product (GDP) at constant price 2015 in 2021 rebounded to 2.4 per cent (2020: -1.2%) at RM25.8 billion (2020: 25.2 billion). Kelantan's GDP contributed 1.9 per cent to Malaysia's GDP. Meanwhile, GDP per capita at current price increased to RM15,584 (2020: RM14,951). ***[Exhibit 1.1]***

As industries are allowed to operate at full capacity, the release of pollutants into the air also increased. Furthermore, several natural disasters such as floods have occurred in 2021 in several states have an impact on the environment.

Exhibit 1.1: Economic Summary of Kelantan, 2020 and 2021

	2020[e]	2021[p]
GDP at constant price 2015	RM25.2 billion	RM25.8 billion
Annual percentage change	-1.2%	2.4%
Percentage contribution to GDP	1.9%	1.9%
GDP per capita at current price	RM14,951	RM15,584

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 (6) 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 3****.*

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_{10} in the air in Kelantan again showed an increase after the implementation of MCO 3.0 and the National Recovery Plan (NRP) which was first introduced on 29th June 2021 as compared to the same period in 2020. Kota Bharu station showed an increase and Tanah Merah station showed a decrease in PM_{10} in 2021.

Meanwhile, the annual average trend concentration of $PM_{2.5}$ in the air in Kelantan in 2021 recorded an increase at Kota Bharu station and a decrease at Tanah Merah station compared to 2020.

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 (NO_x). These VOCs and NO_x are produced by motor vehicles and industrial sources.

The annual average trend concentration of O_3 in the air increased throughout the implementation of MCO 3.0 and NRP. In general, O_3 readings in 2021 are higher than in 2020. This is due to the opening of 11 economic activities under Phase 1 of NRP.

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 2021 showed a decrease Kota Bharu station as compared to 2020 due to the control of cross-state movement and working from home by indirectly reduced the usage of vehicles. Nevertheless, the opening of the economic sector as well as the cross-state authorization led to an increase in CO concentration.

Sulphur Dioxide (SO_2)

SO_2 is a colourless, water-soluble reactive gas with an unpleasant odour. Excessive exposure to high concentration of SO_2 in the atmosphere causes respiratory illnesses and cardiovascular complications.

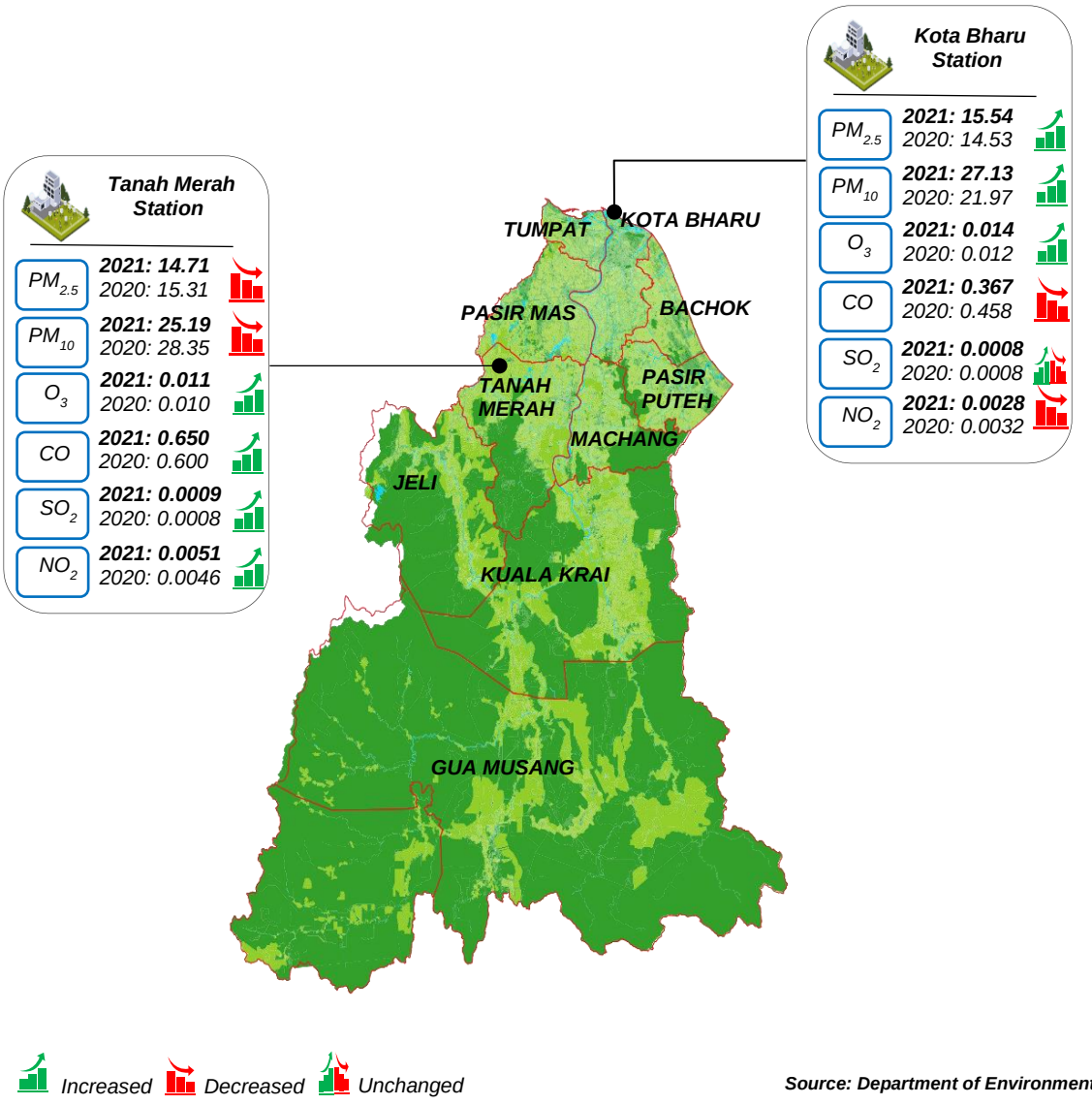
The annual average trend concentration of SO_2 in 2021 increased as compared to 2020 except for Kota Bharu station.

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 2021 showed an increase at Tanah Merah station as compared to 2020. ***[Exhibit 1.2]***

Exhibit 1.2: Summary of air pollutants statistics by station, Kelantan, 2020 and 2021



Increased Decreased Unchanged

Source: Department of Environment

Legend:

$PM_{2.5}$	Particulate Matter 2.5 micron (µg/m³)	CO	Carbon Monoxide (ppm)
PM_{10}	Particulate Matter 10 micron (µg/m³)	SO_2	Sulphur Dioxide (ppm)
O_3	Ground Level Ozone (ppm)	NO_2	Nitrogen Dioxide (ppm)

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.

Kelantan has three meteorological stations which used to monitor the weather conditions continuously and provide meteorological data as an input for weather forecasting. The stations are Gong Kedak, Kota Bharu and Kuala Krai.

Mean temperature

Kuala Krai station recorded the highest mean temperature of 32.4°C, a decrease 0.5°C as compared to 32.9°C in 2020. Kuala Krai station also recorded the lowest mean temperature at 23.1°C, as compared to that recorded in 2020 which was 23.5°C.

Rainfall distribution

Gong Kedak Station recorded the highest annual rainfall in 2021 which was 3,065.8 mm as compared to year 2020 (3,808.0 mm). However, Kota Bharu Station recorded the lowest annual rainfall of 2,527.6 mm in 2021 as compared to previous year (2,9848.4 mm)

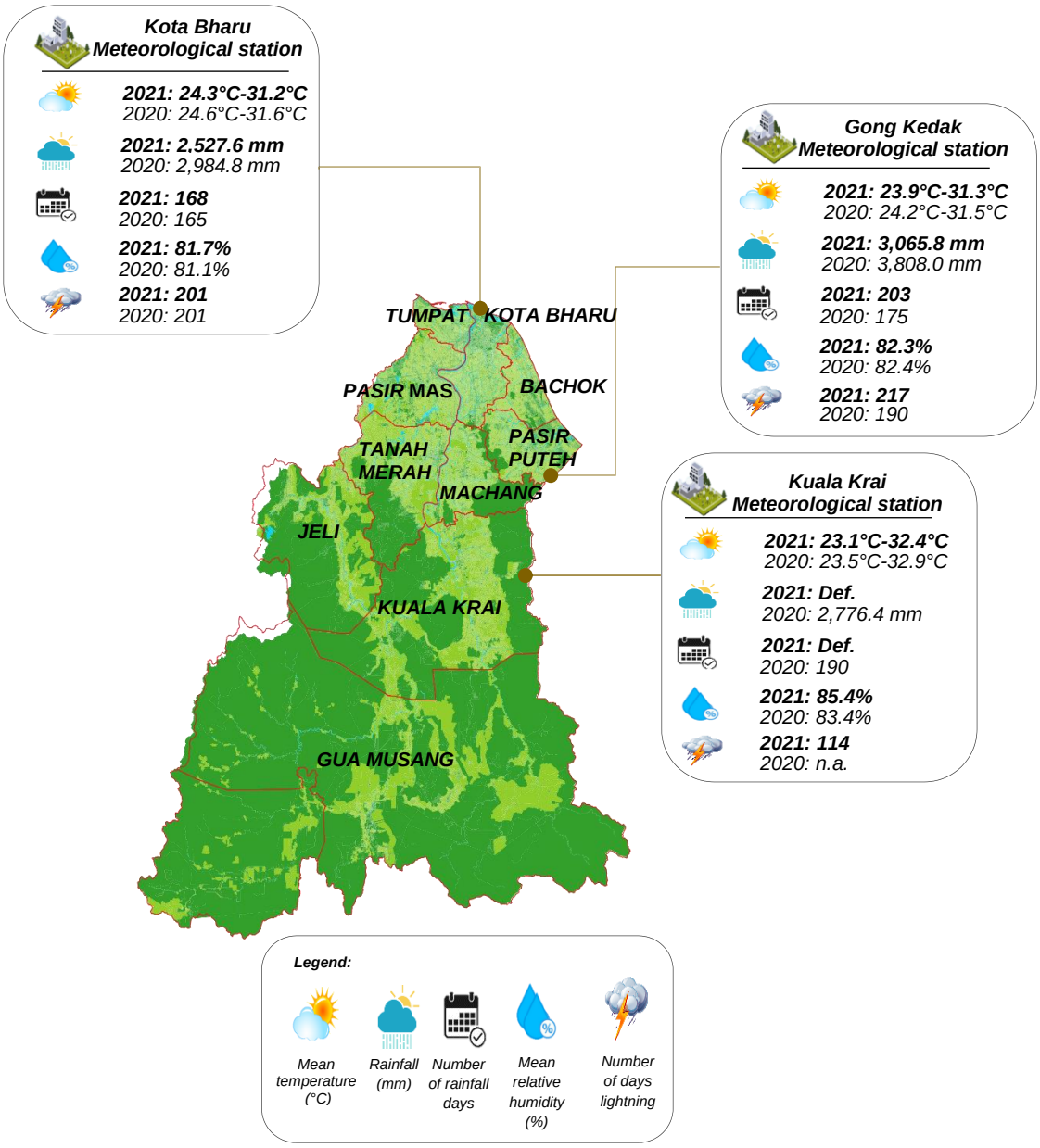
Mean relative humidity

The mean relative humidity in Kelantan was between 81.7 per cent (Kota Bharu) and 85.4 per cent (Kuala Krai) in 2021. However, these readings increased as compared to 2020 which is between 81.1 per cent (Kota Bharu) and 83.4 per cent (Kuala Krai).

Number of days with lightning

Gong Kedak station recorded the highest number of lightning days with 217 days. Meanwhile, Kuala Krai station recorded the lowest number of lightning days at 114 days in 2021. ***[Exhibit 1.3]***

Exhibit 1.3: Summary of climate statistics at meteorological stations, Kelantan, 2020 and 2021



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 as we use it to burn fuels for heating, transportation, power generation and others.

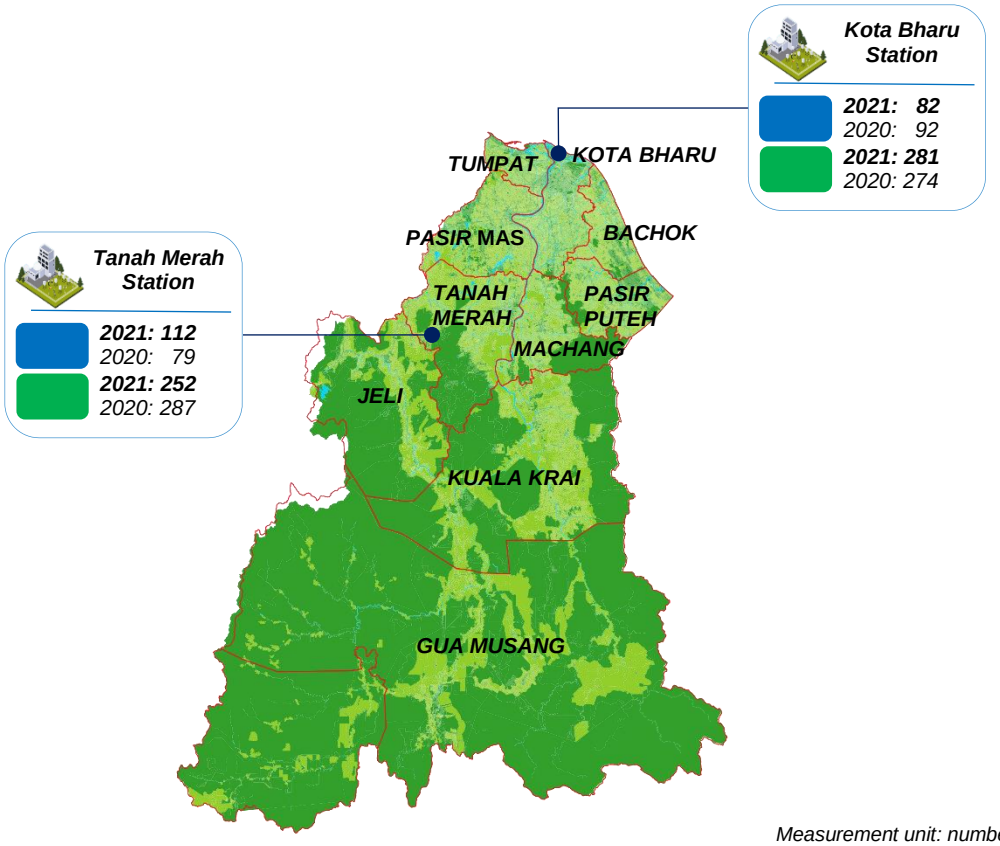
Air Pollution Index

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 Ground Level 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 ($PM_{2.5}$).

During the implementation of the MCO, Tanah Merah station registered the highest number of days (112 days) with "good" air quality as compared to 79 days in 2020. Meanwhile, Kota Bahru station registered 82 days of "good" air quality (2020: 92 days). 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]***

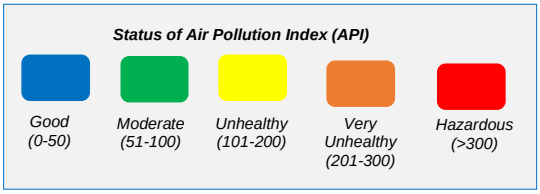
Exhibit 1.4: Status of air quality[1] by station, Kelantan, 2020 and 2021



Measurement unit: number of days

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

Source: Department of Environment



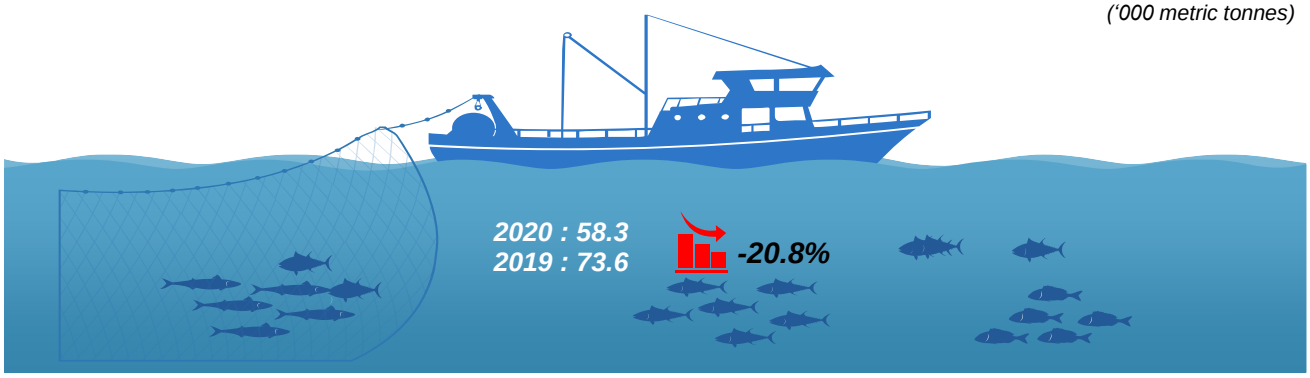
D. Biological resources

Malaysia's sea are among the most biologically diversified 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 2021 was 58.3 thousand metric tonnes, decreased 20.8 per cent as compared to 73.6 thousand metric tonnes in 2020. ***[Exhibit 1.5]***

Exhibit 1.5: Landings of marine fish, Kelantan, 2020 and 2021

('000 metric tonnes)



Growth rate (%)

Source: Department of Fisheries Malaysia

E. Clinical waste

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 waste under the First Schedule Environmental Quality (Scheduled Wastes) Regulations, 2005.

The COVID-19 pandemic had a direct impact on clinical waste due to the use of personal protective equipment (PPE) and COVID-19 test equipment in the handling of COVID-19 patients in health facilities and quarantine centres. Kelantan also recorded 1,857.4 metric tonnes of clinical waste in 2021 as compared to 1377.4 metric tonnes recorded in 2020. ***[Exhibit 1.6]***

Exhibit 1.6: Quantity of clinical waste, Kelantan, 2020 and 2021

(Metric tonnes)

Clinical waste

2020: 1,857.4
2019: 1,377.4

34.8%

Growth rate (%)

Source: Department of Environment

ARTIKEL
ARTICLE

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Sisa Klinikal di Kelantan, 2006-2021

Di Malaysia, penjanaan sisa klinikal daripada kemudahan penjagaan kesihatan telah meningkat dengan pesat sejak beberapa dekad yang lalu. Kebanyakan sektor ekonomi di Malaysia mengamalkan ekonomi linear yang kurang cekap dalam penggunaan sumber, seterusnya menghasilkan jumlah sisa yang tinggi. Amalan penggunaan dan pengeluaran yang tidak mampan ini menjejaskan alam sekitar dan daya tahan ekonomi dalam jangka panjang. Amalan ini juga mengakibatkan kos pembersihan dan mitigasi yang tinggi. Taraf kehidupan yang semakin baik, kemajuan teknologi dan pertambahan bilangan produk dalam pasaran telah mempengaruhi corak penggunaan dan gaya hidup. Walaupun perubahan ini telah meningkatkan kualiti hidup, namun ia mengakibatkan lebih banyak sisa dihasilkan. Tambahan pula, terdapat lambakan produk berjangka hayat pendek, sekali guna dan pakai buang dalam pasaran. Produk tersebut juga mengandungi campuran bahan kompleks yang semakin meningkat, termasuk plastik dan bahan berbahaya yang mengakibatkan sisa tersebut sukar diurus dengan selamat.[1]

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. Oleh itu, sisa klinikal harus diurus dan dikendalikan dengan betul supaya tidak menimbulkan bahaya kepada alam sekitar jika terdedah kepada umum. Walau bagaimanapun, pengurusan sisa bukanlah satu tugas yang mudah kerana ia memerlukan pertimbangan yang menyeluruh terhadap banyak aspek, termasuk ekonomi, teknikal, sosial, dan alam sekitar.

Di Malaysia, sisa klinikal dikawal di bawah Peraturan Kualiti Alam Sekeliling (Sisa Terjadual) 2005 dengan mengikut prosedur operasi standard. Peraturan ini menggariskan amalan dan keperluan bagi penjanaan sisa klinikal untuk mematuhi dan merasionalisasikan kaedah pengurusan sisa klinikal yang konsisten dalam negara.

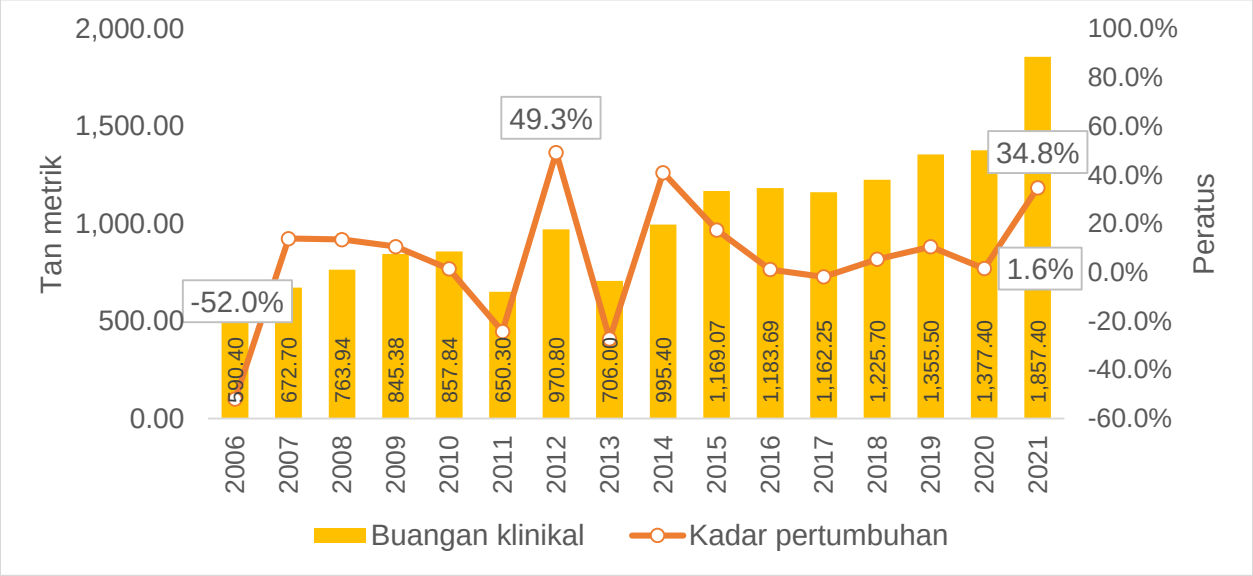
[1] Rancangan Malaysia Kedua Belas, 2021-2025

Di bawah peraturan itu, sisa klinikal dikategorikan sebagai bahan buangan terjadual yang merujuk kepada sisa yang dihasilkan daripada bidang perubatan, kejururawatan, pergigian, veterinar, farmasi ataupun amalan-amalan yang berkaitan penyelidikan, rawatan, pengajaran dan penyelidikan atau pemindahan darah yang menyebabkan jangkitan, toksik dan sebagainya, tisu manusia atau haiwan, darah atau cecair badan, ubat-ubat dan bahan farmasi, pembalut luka, jarum suntikan atau benda-benda tajam ataupun yang mungkin bahaya apabila tersentuh[2].

Kajian dan analisis buangan klinikal sepanjang dua dekad ini adalah bertujuan untuk melihat trend buangan klinikal Negeri Kelantan. Sepanjang 16 tahun, perubahan peratusan tahunan buangan sisa klinikal yang dihasilkan menunjukkan trend tertinggi dicatatkan pada 2012 dengan 49.3 peratus manakala penurunan tertinggi dicatatkan pada 2006 (-52.0%). Kuantiti buangan klinikal yang direkodkan pada 2021 adalah sebanyak 1.86 ribu tan metrik, meningkat 34.8 peratus berbanding 1.38 ribu tan metrik pada tahun sebelumnya disebabkan oleh COVID-19. **[Carta 1]**

Carta 1

Buangan klinikal yang dihasilkan, Kelantan, 2006-2021



Sumber: Jabatan Alam Sekitar

[2] *Guidelines on The Handling and Management of Clinical Wastes in Malaysia*

Malaysia telah menyatakan komitmen dan sokongan terhadap inisiatif dan kawalan ke atas pengurusan sisa dan bahan kimia berbahaya yang selamat kepada kesihatan manusia dan alam sekitar di peringkat global. Sebagai ahli parti kepada Konvensyen Basel, Malaysia telah mewujudkan kerangka perundangan dan dasar negara ke arah pengurusan sisa berbahaya dan juga sisa-sisa lain secara mesra alam. Melalui usaha ini, Malaysia telah mengambil langkah perlu untuk menangani pencemaran, perubahan iklim dan kemerosotan biodiversiti. Penggunaan *Ban Amendment* telah menghentikan pergerakan rentas sempadan sisa berbahaya daripada negara-negara ahli *Organisation for Economic Co-operation and Development* (OECD), *European Union* (EU) dan Liectenstein ke negara membangun termasuk Malaysia.

Pencegahan, pengesanan dan tindakan terhadap pergerakan merentas sempadan haram bagi sisa berbahaya dan sisa lain juga merupakan elemen penting dalam menghadapi cabaran pengurusan sisa global. Antara cabaran yang dihadapi Malaysia adalah untuk mendapatkan kerjasama yang lebih baik daripada negara-negara pengeksport bagi mengambil semula sisa mereka.

Menyedari bahawa terdapat bahan kimia yang akan dimansuhkan secara berperingkat di bawah Konvensyen Stockholm, Malaysia telah menegaskan akan kepentingan menguruskan stok simpanan bahan kimia secara mesra alam agar ia tidak menjadi isu baharu bagi negara membangun pada masa hadapan.[3]

[3] Kenyataan Media YB Menteri Alam Sekitar dan Air, 2 Jun 2022

Clinical Waste in Kelantan, 2006-2021

Malaysia's clinical waste generation from healthcare facilities has rapidly increased over the past few decades and the outbreak of COVID-19 recently doubled the clinical waste. Most economic sectors in Malaysia have been practising the linear economy, which is inefficient in its use of resources, hence generating high volumes of waste. Such unsustainable consumption and production practices are detrimental to the environment and long-term economic resilience. These practices have also resulted in expensive clean-up and mitigation measures. The improvements in living standards, advancement in technology and proliferation of products in the market have influenced consumption patterns and lifestyles. Although these changes have improved the quality of life, more waste is generated. Markets are also inundated with shorter lifespan, single-use and disposable products, with an increasingly complex mix of materials, including plastics and hazardous substances, which are difficult to manage safely.[1]

Clinical waste 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 waste under the First Schedule Environmental Quality (Scheduled Wastes) Regulations, 2005. Therefore, they should be managed and handled properly. However, waste management is not an easy task because it requires a comprehensive consideration of many aspects, including economical, technical, social, and environmental.

In Malaysia, clinical waste is controlled under the Environmental Quality (Scheduled Waste) Regulation, 2005 by following the standard operating procedure. This regulation outlined the practices and requirements for the clinical waste generator to comply with and rationalise consistent clinical waste management methods within the country.

Under that regulation, clinical waste is categorised as scheduled waste which refers to waste produced from the fields of medicine, nursing, dentistry, veterinary, pharmacy or practices related to research, treatment, teaching and research or blood transfusions that cause infection, toxic and so on, human or animal tissue, blood or

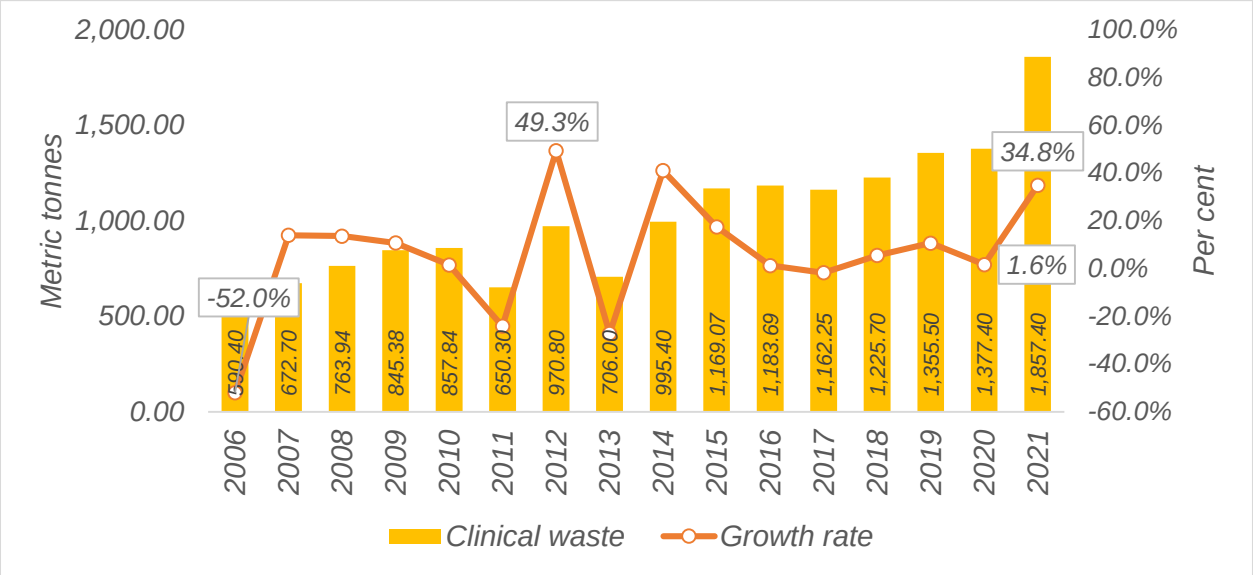
[1] *Twelfth Malaysia Plan, 2021-2025*

body fluids, medicines and pharmaceuticals, wound dressings, injection needles or sharp objects or which may be dangerous when touched.[2]

The study and analysis of clinical waste during these two decades is aimed at seeing the trend of clinical waste in the state of Kelantan. Over the course of 16 years, the annual percentage change of clinical waste produced showed the highest trend recorded in 2012 with 49.3 per cent while the highest decrease was recorded in 2006 (-52.0%). The quantity of clinical waste recorded in 2021 was 1.86 thousand metric tonnes, an increase of 34.8 per cent as compared to 1.38 thousand metric tons in the previous year. ***[Chart 1]***

Chart 1

Clinical waste, Kelantan, 2006-2021



Source: Department of Environment

Malaysia has expressed its commitment and support for initiatives and controls on the management of waste and hazardous chemicals that are safe for human health and the environment at the global level. As a member party to the Basel Convention, Malaysia has created a legal framework and national policy towards the management of hazardous waste and other waste in an environmentally friendly manner.

[2] *Guidelines on the Handling and Management of Clinical Wastes in Malaysia*

Through this effort, Malaysia has taken the necessary steps to deal with pollution, climate change and the decline of biodiversity. The Ban Amendment has stopped the cross-border movement of hazardous waste from member countries of the Organization for Economic Co-operation and Development (OECD). European Union (EU) and Liechtenstein to developing countries including Malaysia.

Prevention, detection and action against illegal transboundary movement of hazardous and other wastes are also an important element in meeting the challenges of global waste management. Among the challenges facing Malaysia is getting better cooperation from exporting countries to recall their waste.

Realising that there are chemicals that will be phased out under the Stockholm Convention, Malaysia has emphasised the importance of managing chemical stocks in an environmentally friendly manner so that they do not become a new issue for developing countries in the future.[3]

[3] *Media Statement of YB Minister of Environment and Water, 2 June 2022*

JADUAL STATISTIK
STATISTICAL TABLES

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Jadual 1.1: Purata suhu, volum hujan dan purata kelembapan relatif, Kelantan, 2017-2021
Table 1.1: Mean temperature, rainfall volume and mean relative humidity, Kelantan, 2017-2021

Stesen meteorologi (ketinggian dari purata paras laut dalam meter) *Meteorological station (height above mean sea level in metres)*	Tahun *Year*	Purata suhu (°C) *Mean temperature*		Hujan *Rainfall*		Purata kelembapan relatif *Mean relative humidity* (%)
		Min.	Maks. *Max.*	Jumlah *Total* (mm)	Bil. hari *No. of days*	
Gong Kedak (6.0 m)	2017	-	-	-	-	-
	2018	-	-	-	-	-
	2019	24.2	32.0	1,157.4	164	80.4
	2020	24.2	31.5	3,808.0	175	82.4
	2021	**23.9**	**31.3**	**3,065.8**	**203**	**82.3**
Kota Bharu (4.4 m)	2017	24.3	30.9	3,380.0	173	82.4
	2018	24.4	31.2	2,887.0	157	82.1
	2019	24.5	31.9	1,803.2	149	79.7
	2020	24.6	31.6	2,984.8	165	81.1
	2021	**24.3**	**31.2**	**2,527.6**	**168**	**81.7**
Kuala Krai (34.9 m)	2017	23.7	32.5	3,457.4	207	89.0
	2018	23.4	33.0	2,297.2	171	85.7
	2019	23.2	33.0	2,313.6	180	Def.
	2020	23.5	32.9	2,776.4	190	83.4
	2021	**23.1**	**32.4**	**Def.**	**Def.**	**85.4**

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

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, Kelantan, 2019-2021
Table 1.2: Mean sea level pressure, surface wind speed, global radiation, evaporation and number of days with lightning, Kelantan, 2019-2021

Stesen meteorologi (ketinggian dari purata paras laut dalam meter) *Meteorological station (height above mean sea level in metres)*	Tahun *Year*	Purata tekanan aras laut *Sea level pressure* (hPa)	Purata kelajuan angin permukaan *Mean surface wind speed* (m/s)	Purata sinaran global *Mean global radiation* (MJ/m^3)	Purata penyejatan *Mean evaporation* (mm)	Bil. hari kilat *No. of days with lightning*
Gong Kedak (6.0 m)	2019	1,010.1	1.3	n.a.	n.a.	195
	2020	1,009.6	1.5	n.a.	n.a.	190
	2021	**1,009.6**	**1.4**	**n.a.**	**n.a.**	**217**
Kota Bharu (4.4 m)	2019	1,010.4	2.4	19.71	4.23	200
	2020	1,010.0	2.4	18.76	4.20	201
	2021	**1,010.0**	**2.2**	**18.90**	**4.00**	**201**
Kuala Krai (34.9 m)	2019	1,010.3	1.0	17.48	4.25	n.a.
	2020	1,009.9	0.9	17.06	4.20	n.a.
	2021	**1,009.9**	**0.9**	**17.20**	**3.70**	**114**

Sumber: Jabatan Meteorologi Malaysia
Source: Malaysia Meteorological Department

Jadual 1.3: Purata bulanan tekanan aras laut, Kelantan, 2021
Table 1.3: Monthly mean sea level pressure, Kelantan, 2021

hPa

Stesen *Station*	Jan.	Feb.	Mac *Mar.*	Apr.	Mei *May*	Jun *June*	Julai *July*	Ogos *Aug.*	Sept.	Okt. *Oct.*	Nov.	Dis. *Dec.*
Gong Kedak	1,010.8	1,011.5	1,010.0	1,009.6	1,008.2	1,009.2	1,008.4	1,009.4	1,008.9	1,008.9	1,008.7	1,011.3
Kota Bharu	1,011.2	1,011.8	1,010.4	1,010.0	1,008.6	1,009.6	1,008.8	1,009.8	1,009.3	1,009.4	1,009.1	1,011.7
Kuala Krai	1,011.0	1,011.5	1,010.2	1,009.9	1,008.5	1,009.6	1,008.8	1,009.8	1,009.2	1,009.3	1,009.0	1,011.5

Sumber: Jabatan Meteorologi Malaysia
Source: Malaysia Meteorological Department

Jadual 1.4: Purata bulanan kelajuan angin permukaan, Kelantan, 2021
Table 1.4: Monthly mean surface wind speed, Kelantan, 2021

m/s

Stesen *Station*	Jan.	Feb.	Mac *Mar.*	Apr.	Mei *May*	Jun *June*	Julai *July*	Ogos *Aug.*	Sept.	Okt. *Oct.*	Nov.	Dis. *Dec.*
Gong Kedak	1.8	1.6	1.8	1.4	1.5	1.5	1.3	1.2	1.3	1.3	1.1	1.6
Kota Bharu	3.5	2.8	3.0	2.0	1.9	1.9	1.8	1.8	1.8	1.7	1.4	2.9
Kuala Krai	1.0	1.3	1.1	0.9	0.8	0.8	0.7	0.8	0.8	0.8	0.8	1.0

Sumber: Jabatan Meteorologi Malaysia
Source: Malaysia Meteorological Department

Jadual 1.5: Purata bulanan sinaran global, Kelantan, 2021
Table 1.5: Monthly mean global radiation, Kelantan, 2021

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 Bharu	14.49	22.19	22.74	22.30	20.49	20.71	18.09	19.29	19.18	19.24	13.35	14.67
Kuala Krai	11.32	20.33	18.62	19.39	18.73	19.29	18.77	17.58	18.90	18.57	12.77	12.70

Sumber: Jabatan Meteorologi Malaysia
Source: Malaysia Meteorological Department

Jadual 1.6: Purata bulanan penyejatan, Kelantan, 2021
Table 1.6: Monthly mean evaporation, Kelantan, 2021

mm

Stesen *Station*	Jan.	Feb.	Mac *Mar.*	Apr.	Mei *May*	Jun *June*	Julai *July*	Ogos *Aug.*	Sept.	Okt. *Oct.*	Nov.	Dis. *Dec.*
Kota Bharu	3.1	4.6	5.4	4.9	4.2	4.0	3.7	4.1	4.3	3.9	2.9	3.3
Kuala Krai	2.9	4.2	4.3	3.8	4.1	3.9	4.4	3.5	3.5	3.5	2.7	3.2

Sumber: Jabatan Meteorologi Malaysia
Source: Malaysia Meteorological Department

Jadual 1.7: Bacaan maksimum harian Indeks Ultra Ungu (UV), Kota Bharu, 2021
Table 1.7: Daily maximum reading of the Ultra Violet (UV) Index, Kota Bharu, 2021

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

Nota:
Notes:

Sumber: Jabatan Meteorologi Malaysia
Source: Malaysia Meteorological Department

Def. **Nilai *Defective***
Defective value
.. **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 Kelantan
Table 1.8: List of major river basins in Kelantan

Bil. *No.*	Nama Lembangan sungai *River basins name*	Luas (km^2) *Area*	Kategori *Category*	Negeri/Negara *State/Country*
1.	Sg. Kelantan	12,981.19	1	Kelantan
2.	Sg. Kemasin	347.66	1	Kelantan
3.	Sg. Semerak	500.50	2	Kelantan/ Terengganu
4.	Sg. Golok	1,011.13	3	Kelantan/ Thailand

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

Nota:
Notes:

Kajian Persempadanan Lembangan Sungai Kelantan Fasa I oleh Bahagian Pengurusan Lembangan Sungai (2009)
River Basin Kelantan Boundary Survey Phase I by the River 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

Kategori 3: Lembangan sungai melibatkan negara lain
Category 3: River basin shared with other country

Lembangan sungai utama: Lembangan yang berkeluasan melebihi 80 km^2
Main river basins: An area of over 80 km^2

Jadual 1.9: Panjang pesisiran pantai, Kelantan
Table 1.9: Coastal lenght, Kelantan

Negeri *State*	Panjang pantai (km) *Coastal length*	Peratus *Per cent*
Malaysia	**8,840.0**	**100.0**
Kelantan	179.5	2.0

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

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

Jadual 1.10: Empangan dan kolam takungan di Kelantan
Table 1.10: Dams and reservoirs in Kelantan

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* (km^2)	Kapasiti *Capacity* (Mm^3)	Luahan alur limpah maksimum *Maximum flood flow* (cumecs)	Luas permukaan *Surface area* (km^2)	Aras biasa *Ordinary level* (m)
Bukit Kwong (1979)	Kelantan	7.62	1,524.00	18.29	11.00	14.30	42.50	4.04	16.76
Pergau (1996)	Kelantan	75.00	750.00	642.00	154.00	62.50	2,470.00	4.30	636.00

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

Jadual 1.11: Keluasan tanah mengikut daerah, Kelantan, 2022
Table 1.11: Land area by district, Kelantan, 2022

Bil. *No.*	Negeri/ Daerah *State/ Districts*	Keluasan (km^2) *Area*
	MALAYSIA	**330,411.35**
	Kelantan	**15,032.43**
1.	Bachok	278.55
2.	Kota Bahru	402.77
3.	Machang	526.37
4.	Pasir Mas	569.50
5.	Pasir Puteh	423.34
6.	Tanah Merah	879.81
7.	Tumpat	180.32
8.	Gua Musang	6,354.42
9.	Kuala Krai	2,274.77
10.	Lojing	1,816.29
11.	Jeli	1,326.29

Sumber: Jabatan Ukur dan Pemetaan Malaysia
Source: Department of Survey and Mapping Malaysia

Jadual 1.12: Kawasan perlindungan yang digazet, Kelantan
Table 1.12: Gazetted protected area, Kelantan

Kawasan perlindungan *Protected area*	Keluasan (Hektar) *Area (Hectares)*	Bilangan spesis *Number of species*				
		Fauna				
		Mamalia *Mammals*	Burung *Birds*	Reptilia *Reptiles*	Amfibia *Amphibians*	Moluska *Molluscs*
Taman Negara Negeri Kelantan	80,250.0	178	353	101	81	-
Taman Negeri Gunung Stong	21,950.0	106	57	30	18	12

Kawasan perlindungan *Protected area*	Bilangan spesis *Number of species*					
	Fauna			Flora		
	Ikan *Fish*	Cnidarians	Spesis invertebrata yang lain[1] *Other invertebrate species*	Rumpai laut *Seaweeds*	Rumput laut *Sea grass*	Tumbuhan *Plants*
Taman Negara Negeri Kelantan	-	-	-	-	-	-
Taman Negeri Gunung Stong	9	-	141	-	-	197

Nota/*Notes*:

[1]**Lain-lain invertebrata seperti Serangga, Arthropods dan Echinoderms**
Other invertebrates like Insects, Arthropods and Echinoderms

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

- : 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, Kelantan, 2014-2018
Table 1.13: Forested and non-forested areas, Kelantan, 2014-2018

Tahun *Year*	Berhutan *Forested*		Tidak Berhutan *Non-Forested*	
	Hektar *Hectares*	(%)	Hektar *Hectares*	(%)
2014	812,196	53.77	698,304	46.23
2015	812,196	53.77	698,304	46.23
2016	812,196	53.77	698,304	46.23
2017	810,415	53.65	700,047	46.35
2018	**810,415**	**53.65**	**700,047**	**46.35**

Sumber: Kementerian Tenaga dan Sumber Asli dan Jabatan Perhutanan Semenanjung Malaysia
Source: Ministry of Energy and Natural Resources and Forestry Department Peninsular Malaysia

Jadual 1.14: Keluasan hutan simpanan kekal[1], Kelantan, 2014-2018
Table 1.14: Area of permanent reserved forest, Kelantan, 2014-2018

Hektar
Hectares

Tahun *Year*	2014	2015	2016	2017[2]	**2018**
Keluasan *Area*	623,849	623,849	635,437	613,275	**613,275**

Sumber: Kementerian Tenaga dan Sumber Asli dan Jabatan Perhutanan Semenanjung Malaysia
Source: Ministry of Energy and Natural Resources and Forestry Department Peninsular Malaysia

Nota:
Notes:

[1] **Hutan Simpanan Kekal di Semenanjung Malaysia terdiri daripada hutan darat, paya gambut, paya laut dan ladang hutan**
Permanent reserved forest in Peninsular Malaysia consists of inland forest, peat swamp forest, mangrove forest and forest plantation

[2] **Mulai 2017 pelaporan keluasan Hutan Simpanan Kekal (HSK) di Semenanjung Malaysia adalah berdasarkan keluasan HSK yang diwarta sahaja (tidak termasuk cadangan HSK)**
Since 2017, Permanent Reserve Forest (PRF) data in Peninsular Malaysia were reported based on gazetted PRF only (proposed PRF not included)

Jadual 1.15: Status kualiti udara mengikut stesen, Kelantan, 2017 - 2021
Table 1.15: Air quality status by station, Kelantan, 2017-2021

Bilangan hari
Number of days

Stesen *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)
Kota Bharu	2017	276	86	-	-	-
	2018	86	278	1	-	-
	2019	46	317	2	-	-
	2020	92	274	-	-	-
	2021	**82**	**281**	**-**	**-**	**-**
Tanah Merah	2017	321	36	2	-	-
	2018	71	292	-	-	-
	2019	63	300	2	-	-
	2020	79	287	-	-	-
	2021	**112**	**252**	**-**	**-**	**-**

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 1.16: Bacaan minimum dan maksimum bulanan Indeks Pencemaran Udara[1] (IPU), Kelantan, 2021
Table 1.16: Monthly minimum and maximum Air Pollutant Index (API), Kelantan, 2021

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.*
Kota Bharu	25	84	31	95	24	75	20	79	26	71	21	85
Tanah Merah	10	88	52	98	15	75	16	75	18	67	16	71

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.*
Kota Bharu	18	138	25	80	16	94	27	87	13	60	19	71
Tanah Merah	13	78	17	68	17	78	20	80	13	58	17	72

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 1.17: Purata tahunan kepekatan berdasarkan jenis bahan pencemar di udara, Kelantan, 2017-2021
Table 1.17: Annually average concentration based on the type of air pollutants in the air, Kelantan, 2017-2021

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)
Kota Bharu	2017	-	24.84	0.015	0.556	0.0007	0.0042
	2018	17.32	27.07	0.014	0.514	0.0006	0.0040
	2019	20.07	29.24	0.015	0.526	0.0007	0.0040
	2020	14.53	21.97	0.012	0.458	0.0008	0.0032
	2021	**15.54**	**27.13**	**0.014**	**0.367**	**0.0008**	**0.0028**
Tanah Merah	2017	-	22.75	0.013	0.519	0.0008	0.0044
	2018	17.77	27.49	0.012	0.581	0.0008	0.0047
	2019	19.40	29.68	0.013	0.681	0.0008	0.0052
	2020	15.31	28.35	0.010	0.600	0.0008	0.0046
	2021	**14.71**	**25.19**	**0.011**	**0.650**	**0.0009**	**0.0051**

Sumber: Jabatan Alam Sekitar
Source: Department of Environment

Jadual 1.18: Purata bulanan kepekatan Habuk Halus ($PM_{2.5}$) di udara, Kelantan, 2017-2021
Table 1.18: Monthly average concentration of Particulate Matter ($PM_{2.5}$) in the air, Kelantan, 2017-2021

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.*
	2017	-	-	-	-	-	-	-	-	-	-	-	-
	2018	13.88	22.30	23.31	17.11	18.03	19.84	20.73	25.21	11.36	12.35	10.95	11.28
Kota Bharu	2019	12.85	12.78	24.38	20.53	14.60	14.73	25.63	28.01	31.91	16.37	18.41	20.12
	2020	14.90	15.07	18.34	15.42	14.13	13.25	15.11	18.79	14.67	12.13	10.88	11.71
	2021	**15.06**	**20.45**	**13.33**	**16.24**	**14.72**	**15.68**	**20.67**	**13.69**	**16.82**	**17.64**	**8.86**	**13.57**
	2017	-	-	-	-	-	-	-	-	-	-	-	-
	2018	13.67	26.52	20.80	20.79	15.99	18.31	21.11	27.06	12.61	12.44	12.88	12.19
Tanah Merah	2019	16.13	19.21	28.86	27.81	14.57	13.82	20.43	23.41	29.48	11.90	10.52	16.82
	2020	19.62	17.85	24.29	18.05	12.75	12.43	14.10	16.84	12.72	11.32	11.08	12.42
	2021	**16.34**	**27.32**	**16.32**	**14.28**	**11.57**	**11.35**	**15.59**	**12.08**	**13.68**	**15.05**	**9.542**	**14.33**

Nota: Garis Panduan Kualiti Udara Malaysia: $PM_{2.5}$ tidak melebihi 50 µg/m^3
Notes: Malaysia Ambient Air Quality Guidelines: $PM_{2.5}$ not exceeding 50 µg/m^3

Sumber: Jabatan Alam Sekitar
Source: Department of Environment

Jadual 1.19: Purata bulanan kepekatan Habuk Halus (PM_{10}) di udara, Kelantan, 2017-2021
Table 1.19: Monthly average concentration of Particulate Matter (PM_{10}) in the air, Kelantan, 2017-2021

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.*
	2017	52.14	61.74	61.55	41.09	-	-	34.61	22.77	19.62	24.26	18.69	28.08
	2018	23.95	35.53	33.92	27.98	25.19	29.35	30.76	36.89	21.25	20.49	18.40	19.85
Kota Bharu	2019	26.62	22.59	34.10	27.73	21.04	22.31	33.95	36.62	41.83	25.82	25.86	31.81
	2020	25.97	27.62	26.24	21.19	19.93	19.88	20.90	26.03	22.18	19.30	16.27	18.31
	2021	**34.80**	**42.59**	**29.06**	**29.77**	**27.15**	**25.70**	**34.00**	**19.43**	**22.63**	**24.55**	**13.89**	**22.28**
	2017	32.42	46.68	47.14	28.90	-	-	25.98	19.19	18.24	24.62	20.40	27.83
	2018	23.89	39.91	33.42	33.08	25.35	26.95	30.22	36.85	19.42	20.05	21.94	20.42
Tanah Merah	2019	28.78	31.35	42.52	38.66	23.07	22.34	29.36	32.53	39.24	19.98	18.57	30.06
	2020	34.68	34.38	35.82	25.45	20.70	21.23	23.68	30.97	28.91	22.23	32.71	29.13
	2021	**28.96**	**47.24**	**30.14**	**25.94**	**20.74**	**17.05**	**22.51**	**20.16**	**22.03**	**24.32**	**18.77**	**26.08**

Nota: Garis Panduan Kualiti Udara Malaysia: PM_{10} tidak melebihi 120 µg/m^3
Notes: Malaysia Ambient Air Quality Guidelines: PM_{10} not exceeding 120 µg/m^3

Sumber: Jabatan Alam Sekitar
Source: Department of Environment

Jadual 1.20: Purata bulanan kepekatan Ozon Permukaan Bumi (O_3) di udara, Kelantan, 2017-2021
Table 1.20: Monthly average concentration of Ground Level Ozone (O_3) in the air, Kelantan, 2017-2021

ppm

Stesen *Station*	Tahun *Year*	Jan.	Feb.	Mac *Mar.*	Apr.	Mei *May*	Jun *June*	Julai *July*	Ogos *Aug.*	Sept.	Okt. *Oct.*	Nov.	Dis. *Dec.*
	2017	0.023	0.027	0.023	0.021	-	-	0.018	0.015	0.014	0.014	0.012	0.018
	2018	0.014	0.021	0.014	0.014	0.013	0.014	0.014	0.016	0.011	0.012	0.012	0.012
Kota Bharu	2019	0.018	0.014	0.016	0.015	0.016	0.014	0.017	0.015	0.016	0.009	0.013	0.021
	2020	0.015	0.017	0.012	0.012	0.012	0.012	0.011	0.013	0.010	0.009	0.011	0.014
	2021	**0.021**	**0.019**	**0.011**	**0.013**	**0.013**	**0.014**	**0.014**	**0.011**	**0.010**	**0.011**	**0.009**	**0.018**
	2017	-	-	-	-	-	-	0.014	0.013	0.011	0.013	0.012	0.014
	2018	0.012	0.017	0.012	0.013	0.012	0.012	0.013	0.014	0.012	0.011	0.011	0.010
Tanah Merah	2019	0.011	0.011	0.015	0.013	0.014	0.012	0.015	0.014	0.015	0.008	0.011	0.014
	2020	0.011	0.012	0.012	0.011	0.010	0.009	0.010	0.011	0.009	0.008	0.008	0.011
	2021	**0.015**	**0.016**	**0.009**	**0.011**	**0.010**	**0.011**	**0.011**	**0.009**	**0.008**	**0.009**	**0.008**	**0.013**

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

Sumber: Jabatan Alam Sekitar
Source: Department of Environment

Jadual 1.21: Purata bulanan kepekatan Karbon Monoksida (CO) di udara, Kelantan, 2017-2021
Table 1.21: Monthly average concentration of Carbon Monoxide (CO) in the air, Kelantan, 2017-2021

ppm

Stesen *Station*	Tahun *Year*	Jan.	Feb.	Mac *Mar.*	Apr.	Mei *May*	Jun *June*	Julai *July*	Ogos *Aug.*	Sept.	Okt. *Oct.*	Nov.	Dis. *Dec.*
	2017	0.411	0.394	0.483	0.342	-	-	0.566	0.457	0.562	0.540	0.674	0.535
	2018	0.627	0.748	0.675	0.687	0.751	0.590	0.602	0.512	0.660	0.651	0.653	0.692
Kota Bharu	2019	0.524	0.405	0.564	0.467	0.482	0.439	0.615	0.729	0.695	0.431	0.476	0.474
	2020	0.420	0.420	0.414	0.351	0.378	0.397	0.506	0.557	0.464	0.396	0.463	0.708
	2021	**0.450**	**0.449**	**0.586**	**0.261**	**0.295**	**0.213**	**0.328**	**0.355**	**0.330**	**0.345**	**0.313**	**0.456**
	2017	-	-	-	-	-	-	0.431	0.359	0.437	0.628	0.589	0.643
	2018	0.525	0.535	0.552	0.512	0.607	0.571	0.566	0.595	0.383	0.370	0.517	0.442
Tanah Merah	2019	0.767	0.720	0.824	0.788	0.642	0.622	0.645	0.628	0.681	0.547	0.607	0.700
	2020	0.708	0.620	0.628	0.602	0.449	0.514	0.527	0.546	0.607	0.500	0.643	0.840
	2021	**0.728**	**0.757**	**0.809**	**0.719**	**0.568**	**0.492**	**0.466**	**0.411**	**0.681**	**0.680**	**0.687**	**0.814**

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

Sumber: Jabatan Alam Sekitar
Source: Department of Environment

Jadual 1.22: Purata bulanan kepekatan Sulfur Dioksida (SO_2) di udara, Kelantan, 2017-2021
Table 1.22: Monthly average concentration of Sulphur Dioxide (SO_2) in the air, Kelantan, 2017-2021

ppm

Stesen *Station*	Tahun *Year*	Jan.	Feb.	Mac *Mar.*	Apr.	Mei *May*	Jun *June*	Julai *July*	Ogos *Aug.*	Sept.	Okt. *Oct.*	Nov.	Dis. *Dec.*
	2017	-	-	-	-	-	-	0.0008	0.0006	0.0008	0.0009	0.0008	0.0005
	2018	0.0005	0.0006	0.0004	0.0004	0.0005	0.0006	0.0007	0.0004	0.0009	0.0007	0.0007	0.0004
Kota Bharu	2019	0.0005	0.0008	0.0008	0.0010	0.0005	0.0009	0.0004	0.0006	0.0005	0.0008	0.0008	0.0008
	2020	0.0006	0.0011	0.0010	0.0009	0.0008	0.0010	0.0008	0.0006	0.0009	0.0005	0.0008	0.0012
	2021	**0.0012**	**0.0013**	**0.0008**	**0.0008**	**0.0008**	**0.0007**	**0.0004**	**0.0007**	**0.0009**	**0.0006**	**0.0008**	**0.0010**
	2017	-	-	-	-	-	-	0.0008	0.0008	0.0009	0.0007	0.0010	0.0007
	2018	0.0009	0.0012	0.0020	0.0006	0.0007	0.0011	0.0005	0.0006	0.0007	0.0006	0.0005	0.0007
Tanah Merah	2019	0.0006	0.0009	0.0008	0.0012	0.0005	0.0010	0.0010	0.0007	0.0008	0.0011	0.0007	0.0007
	2020	0.0009	0.0012	0.0009	0.0007	0.0007	0.0009	0.0008	0.0007	0.0006	0.0006	0.0007	0.0006
	2021	**0.0007**	**0.0009**	**0.0009**	**0.0010**	**0.0008**	**0.0008**	**0.0007**	**0.0009**	**0.0009**	**0.0010**	**0.0013**	**0.0009**

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

Sumber: Jabatan Alam Sekitar
Source: Department of Environment

Jadual 1.23: Purata bulanan kepekatan Nitrogen Dioksida (NO_2) di udara, Kelantan, 2017-2021
Table 1.23: Monthly average concentration of Nitrogen Dioxide (NO_2) in the air, Kelantan, 2017-2021

ppm

Stesen *Station*	Tahun *Year*	Jan.	Feb.	Mac *Mar.*	Apr.	Mei *May*	Jun *June*	Julai *July*	Ogos *Aug.*	Sept.	Okt. *Oct.*	Nov.	Dis. *Dec.*
	2017	0.0025	0.0041	0.0103	0.0093	-	-	0.0064	0.0042	0.0042	0.0046	0.0041	0.0036
	2018	0.0041	0.0041	0.0029	0.0033	0.0036	0.0038	0.0041	0.0048	0.0043	0.0039	0.0044	0.0042
Kota Bharu	2019	0.0033	0.0026	0.0045	0.0045	0.0048	0.0049	0.0047	0.0046	0.0040	0.0037	0.0035	0.0025
	2020	0.0026	0.0027	0.0029	0.0026	0.0027	0.0034	0.0042	0.0034	0.0035	0.0035	0.0037	0.0034
	2021	**0.0020**	**0.0029**	**0.0029**	**0.0032**	**0.0026**	**0.0019**	**0.0031**	**0.0025**	**0.0024**	**0.0037**	**0.0039**	**0.0029**
	2017	0.0086	0.0087	0.0073	0.0062	-	-	0.0041	0.0035	0.0035	0.0047	0.0045	0.0060
	2018	0.0056	0.0068	0.0058	0.0047	0.0040	0.0037	0.0037	0.0045	0.0039	0.0039	0.0040	0.0053
Tanah Merah	2019	0.0069	0.0060	0.0075	0.0061	0.0044	0.0037	0.0042	0.0044	0.0043	0.0039	0.0039	0.0070
	2020	0.0069	0.0067	0.0045	0.0029	0.0033	0.0036	0.0042	0.0044	0.0040	0.0040	0.0050	0.0062
	2021	**0.0069**	**0.0071**	**0.0060**	**0.0049**	**0.0039**	**0.0025**	**0.0032**	**0.0035**	**0.0038**	**0.0048**	**0.0058**	**0.0083**

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

Sumber: Jabatan Alam Sekitar
Source: Department of Environment

Jadual 1.24: Status kualiti air marin di kawasan pesisiran pantai, muara sungai dan pulau berdasarkan Indeks Kualiti Air Marin, Kelantan, 2017-2021

Table 1.24: Status of marine water quality in coastal, estuary and island areas based on Marine Water Quality Index, Kelantan, 2017-2021

Bilangan stesen
Number of stations

Kawasan *Areas*	Kategori *Category*																			
	2017				2018				2019				2020				**2021**			
	E	**G**	**M**	**P**	**E**	**G**	**M**	**P**	**E**	**G**	**M**	**P**	**E**	**G**	**M**	**P**	**E**	**G**	**M**	**P**
Pesisiran pantai *Coastal*	1	5	-	-	6	-	-	-	1	5	-	-	1	4	1	-	**6**	**-**	**-**	**-**
Muara sungai *Estuary*	-	3	3	-	-	1	5	-	-	-	5	1	-	-	6	**-**	**-**	**1**	**5**	**-**
Pulau *Island*	-	2	-	-	2	-	-	-	-	2	-	-	-	1	1	**-**	**2**	**-**	**-**	**-**

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: Keluasan hutan yang dilesenkan untuk pengusahasilan, Kelantan, 2017-2020
Table 2.1: Forest area licensed for harvesting, Kelantan, 2017-2020

Hektar
Hectares

Tahun *Year*	2017	2018	2019	2020
Keluasan *Area*	12,879	21,720	20,196	**15,815**

Sumber: Jabatan Perhutanan Semenanjung Malaysia
Source: Forest Department Peninsular Malaysia

Jadual 2.2: Pengeluaran produk kayu-kayan utama, Kelantan, 2017-2021
Table 2.2: Production of major timber products, Kelantan, 2017-2021

Meter padu
Cubic metres

Tahun *Year*	Kayu balak[1] *Logs*	Kayu gergaji *Sawn timber*	Papan lapis *Plywood*	Venir *Veneer*	Kayu kumai *Moulding*
2017	670,409	446,096	18,277	65,106	-
2018	916,081	515,178	14,703	64,806	-
2019	1,181,211	470,002	13,437	36,402	-
2020	584,701	287,457	20,783	38,543	-
2021	**641,337**	**254,655**	**8,474**	**36,777**	**-**

Sumber: Jabatan Perhutanan Semenanjung Malaysia
Source: Forest Department Peninsular Malaysia

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

Jadual 2.3: Pendaratan ikan laut, Kelantan, 2017-2021
Table 2.3: Landings of marine fish, Kelantan, 2017-2021

Tan metrik ('000)
Metric tonnes

Negeri *State*	2017		2018		2019		2020		**2021**	
	Kuantiti *Quantity*	%	Kuantiti *Quantity*	%	Kuantiti *Quantity*	%	Kuantiti *Quantity*	%	Kuantiti *Quantity*	%
Jumlah *Total*	**1,465.2**	**100.0**	**1,452.9**	**100.0**	**1,455.4**	**100.0**	**1,383.3**	**100.0**	**1,328.0**	**100.0**
Kelantan	196.1	13.4	99.4	6.7	90.2	6.2	73.6	5.3	**58.3**	**4.4**

Sumber: Jabatan Perikanan Malaysia
Source: Department of Fisheries Malaysia

Jadual 2.4: Bilangan ternakan, Kelantan, 2020 dan 2021
Table 2.4: Number of livestock, Kelantan, 2020 and 2021

Bilangan
Number

Tahun *Year*	Jenis ternakan *Type of livestock*						
	Kerbau *Buffalo*	Lembu *Cattle*	Kambing *Goat*	Bebiri *Sheep*	Babi *Swine*	Ayam *Chicken*	Itik *Duck*
2020	4,292	81,307	35,012	24,977	-	5,048,785	47,367
2021[e]	**4,077**	**77,254**	**33,261**	**23,728**	**-**	**5,122,850**	**52,712**

Sumber: Jabatan Perkhidmatan Veterinar
Source: Department of Veterinary Services

Jadual 3.1: Loji rawatan pembetungan awam, Kelantan, 2019-2021
Table 3.1: Public sewerage treatment plant, Kelantan, 2019-2021

Tahun *Year*	LRP *multipoint* *Multipoint STP*[1]			Loji serantau *Regional plant*[2]			**Jumlah** *Total*		
	2019	2020	**2021[p]**	2019	2020	**2021[p]**	2019	2020	**2021[p]**
Population equivalent (PE)	72,077	73,090	**82,004**	-	-	-	72,077	73,090	**82,004**

Nota:
Notes:

Sumber: Suruhanjaya Perkhidmatan Air Negara
Source: National Water Services Commission

[1]**LRP *multipoint*: LRP untuk memenuhi pembangunan yang sporadis dan bertaburan oleh pemaju yang berbeza**
Multipoint STP: STPs to cater for sporadic and scattered developtment by different developers

[2]**Loji serantau: LRP yang dikenal pasti dalam Kajian Pengawasan Pembetungan untuk menampung kawasan tadahan pembetungan**
Regional plant: STPs identified in the Sewerage Catchment Study to cater for a sewerage catchment area

Jadual 3.2: Senarai dan kapasiti kemudahan rawatan dan pelupusan sisa perbandaran, Kelantan, 2021
Table 3.2: List and capacity of municipal waste treatment and disposal facilities, Kelantan, 2021

Tapak Pelupusan *Disposal site*			Loji rawatan termal *Thermal treatment plant*		
Nama tapak *Site name*	Anggaran purata berat sisa yang dilupuskan setiap hari (tan metrik/ hari) *Estimated average weight of waste disposed daily (tonnes/day)*	Luas *Area* (Ha)	Nama loji *Plant name*	Jumlah berat sisa yang dilupuskan (tan metrik/ hari) *Total amount of residual waste (tonnes/ day)*	Luas *Area* (Ha)
TP Kg. Kok Bedollah	130.0	20.2	-	-	-
TP Pusu 40	120.0	4.5	-	-	-
TP Beris Lalang	306.0	30.5	-	-	-
TP Air Belaga	120.0	10.0	-	-	-
TP Bkt. Che Ros	70.0	5.0	-	-	-
TP Kg. Sg. Mekong	15.0	0.8	-	-	-
TP Bkt. Akil	27.0	4.0	-	-	-
TP Jalan Dabong - Sungai Sam	10.0	3.7	-	-	-
TP Bukit Tembeling	19.0	4.5	-	-	-
TP Gua Musang	72.0	32.0	-	-	-

Nota:
Notes:

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

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)*

Jadual 3.3: Bilangan kemudahan rawatan dan pelupusan sisa perbandaran, Kelantan, 2021
Table 3.3: Number of municipal waste treatment and disposal facilities, Kelantan, 2021

Tapak pelupusan di bawah seliaan SWCorp *Disposal site under SWCorp*	Loji rawatan termal *Thermal treatment plant*	Tapak pelupusan bukan di bawah seliaan SWCorp *Disposal site not under SWCorp*
-	-	10

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

Jadual 3.4: Buangan terjadual, Kelantan, 2017-2021
Table 3.4: Scheduled waste, Kelantan, 2017-2021

Tan metrik
Metric tonnes

Tahun *Year*	2017	2018	2019	2020	**2021**
Kuantiti *Quantity*	2,806	2,453	9,810	12,650	**6,949**

Nota: Mulai 2015, statistik ini termasuk buangan terjadual yang diuruskan di bawah pengurusan khas mengikut Peraturan 7, Peraturan-Peraturan Kualiti Alam Sekeliling (Buangan Terjadual) 2005 (Pengurusan Khas)
Note: Since 2015, these statistics include scheduled wastes managed under special management under Rule 7 of the Rules, the Environmental Quality (Scheduled Wastes 2005 (Special Management)

Sumber: Jabatan Alam Sekitar
Source: Department of Environment

Jadual 3.5: Kuantiti buangan klinikal, Kelantan, 2017-2021
Table 3.5: Quantity of clinical waste, Kelantan, 2017-2021

Tan metrik
Metric tonnes

Tahun *Year*	2017	2018	2019	2020	**2021**
Kuantiti *Quantity*	1,162.3	1,225.7	1,355.5	1,377.4	**1,857.4**

Sumber: Jabatan Alam Sekitar
Source: Department of Environment

Jadual 3.6: Bilangan tapak pelupusan sisa pepejal yang beroperasi, Kelantan, 2017-2021
Table 3.6: Number of operating solid waste landfills, Kelantan, 2017-2021

Tahun *Year*	Sanitari *Sanitary*	Bukan sanitari *Non sanitary*	Lengai *Inert*
2017	-	11	-
2018	-	10	-
2019	-	10	-
2020	-	10	-
2021	**-**	**10**	**-**

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

Jadual 4.1: Kejadian bencana, Kelantan, 2018-2021
Table 4.1: Disaster events, Kelantan, 2018-2021

Tahun *Year*	Bilangan kejadian *Number of events*	Mangsa *Victim*	Keluarga *Family*	Pusat pemindahan *Evacuation center*	Kematian *Death*	Rumah rosak *House damaged*
2018	-	94	27	3	-	-
2019	3	23,916	8,420	109	-	-
2020	2	2,101	679	50	5	-
2021	**5**	**18,246**	**5,065**	**187**	**4**	**-**

Nota: Bilangan kejadian bencana adalah berdasarkan keluarga dan mangsa yang telah ditempatkan di Pusat Pemindahan Sementara (PPS) akibat bencana
Notes: Number of disaster events is based on families and victims placed at Temporary Evacuation Centers (PPS) affected by disaster

Sumber: Agensi Pengurusan Bencana Negara
Source: National Disaster Management Agency

Jadual 4.2: Bilangan kejadian banjir yang dilaporkan, Kelantan, 2017-2021
Table 4.2: Number of flood incidents reported, Kelantan, 2017-2021

Tahun *Year*	2017	2018	2019	2020	**2021**
Bilangan *Number*	82	3	18	19	**29**

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

Jadual 4.3: Bilangan kemalangan jalan raya dan kecederaan yang dilaporkan, Kelantan, 2017-2021
Table 4.3: Number of road accidents and casualties reported, Kelantan, 2017-2021

Tahun *Year*	Kemalangan jalan raya *Road accidents*	Kecederaan *Casualties*		
		Kecederaan[1] *Injury*	Kematian *Death*	Jumlah *Total*
2017	10,786	1,528	442	1,970
2018	10,983	1,626	420	2,046
2019	11,295	1,475	338	1,813
2020	9,752	1,892	276	2,168
2021	**7,982**	**1,818**	**224**	**2,042**

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

Sumber: Polis Diraja Malaysia
Source: Royal Malaysia Police

Jadual 4.4: Bilangan kejadian kebakaran, Kelantan, 2017-2021
Table 4.4: Number of fire incidents, Kelantan, 2017-2021

Tahun *Year*	2017	2018	2019	2020	**2021**
Bilangan *Number*	1,160	1,325	2,088	1,559	**1,247**

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

Jadual 4.5: Bilangan kematian, kecederaan dan anggaran kerugian akibat kebakaran yang dilaporkan, Kelantan, 2017-2021
Table 4.5: Number of deaths, injuries and estimated losses caused by fire reported, Kelantan, 2017-2021

Tahun *Year*	Kematian *Death*	Kecederaan *Injury*	Kerugian *Loss* (RM juta/ *millions)*
2017	2	18	232.0
2018	1	13	27.2
2019	2	18	191.0
2020	2	21	31.1
2021	**4**	**14**	**45.2**

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

Jadual 4.6: Taburan kawasan hakisan pantai di Kelantan
Table 4.6: Distribution of coastal erosion areas in Kelantan

Panjang (km) *Length*

Negeri *State*	Jumlah (km) *Total*	Pantai yang mengalami hakisan mengikut kategori[e] *Coastal erode by category*						Jumlah hakisan (km) *Total erosion*	%
		Kategori 1 *Category*		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	**8,840.0**	**44**	**55.4**	**309**	**375.9**	**2,344**	**916.3**	**1,347.6**	**15.2**
Kelantan	179.5	2	2.0	2	2.5	43	15.3	19.8	11.0

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 4m/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 1m/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 1m/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, Kelantan, 2018-2022
Table 5.1: Mid-year population estimates, Kelantan, 2018-2022

Tahun *Year*	2018	2019	2020	2021	**2022[p]**	Kadar pertumbuhan penduduk tahunan *Annual population growth rate (%)*	
			('000)			**2020/2021**	**2021/2022**
Penduduk *Population*	1,860.5	1,883.8	1,792.5	1,812.3	**1,829.3**	**1.1**	**0.9**

Nota:
Note:

2020-2022[p]
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

2018 - 2019
Berdasarkan Anggaran Penduduk Pertengahan Tahun berasaskan data Banci Penduduk dan Perumahan 2010
Mid-Year Population Estimates based on Population and Housing Census of Malaysia 2010

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

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

Jadual 5.2: Kepadatan penduduk, Kelantan, 2018-2022
Table 5.2: Population density, Kelantan, 2018-2022

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

Tahun *Year*	2018	2019	2020	2021	**2022[p]**
Kepadatan penduduk *Population density*	124	125	119	120	**122**

Nota:
Note:

2020-2022[p]
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

2018 - 2019
Berdasarkan Anggaran Penduduk Pertengahan Tahun berasaskan data Banci Penduduk dan Perumahan 2010
Mid-Year Population Estimates based on Population and Housing Census of Malaysia 2010

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

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

Jadual 5.3: Peratusan isi rumah dengan kemudahan bekalan elektrik mengikut strata, Kelantan, 2019
Table 5.3: Percentage of households with the accessibility to electricity supply by strata, Kelantan, 2019

	Kemudahan bekalan elektrik *Accessibility to electricity supply*		
	Jumlah *Total*	Bandar *Urban*	Luar bandar *Rural*
Malaysia	100.0	100.0	99.8
Kelantan	100.0	100.0	100.0

Nota: Berdasarkan Laporan Penyiasatan Pendapatan Isi Rumah dan Kemudahan Asas 2019
Notes: Based on Household Income and Basic Amenities Report 2019

Jadual 5.4: Kadar insiden keracunan makanan, kolera dan tifoid, Kelantan, 2017-2021
Table 5.4: Incidence rate of food poisoning, cholera and typhoid, Kelantan, 2017-2021

Bagi setiap 100,000 penduduk
Per 100,000 population

Insiden *Incidence*	2017	2018	2019	2020	**2021**
Keracunan makanan *Food poisoning*	41.6	36.1	47.7	22.6	**3.5**
Kolera *cholera*	-	-	-	-	-
Tifoid *Typhoid*	2.0	2.3	0.7	0.7	**0.3**

Sumber: Kementerian Kesihatan Malaysia
Source: Ministry of Health Malaysia

Jadual 5.5: Bilangan kes demam denggi, demam denggi berdarah dan malaria, Kelantan, 2017-2021
Table 5.5: Number of dengue fever, dengue haemorrhagic fever and malaria cases, Kelantan, 2017-2021

Kes *Cases*	2017	2018	2019	2020	**2021**
Demam denggi *Dengue fever*	2,508	1,944	5,992	3,881	**223**
Demam denggi berdarah *Dengue haemorrhagic fever*	7	6	11	8	-
Malaria *Malaria*	168	135	119	111	**124**

Sumber: Kementerian Kesihatan Malaysia
Source: Ministry of Health Malaysia

Jadual 6.1: Perbelanjaan perlindungan alam sekitar mengikut jenis perbelanjaan, Kelantan, 2015-2020

Table 6.1: Environmental protection expenditure by type of expenditure, Kelantan, 2015- 2020

RM '000

Jenis *Type*	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*	2015	27,493	17,739	345	740	8,568	101
	2017	31,434	19,492	361	1,620	9,057	903
	2018	14,625	10,088	104	489	3,867	78
	2019	10,650	7,518	15	505	2,568	43
	2020	**28,912**	**12,400**	**6,310**	**1,711**	**8,400**	**91**
Modal *Capital*	2015	1,278	888	10	120	246	14
	2017	2,788	2,331	10	24	424	-
	2018	1,072	876	29	119	-	51
	2019	3,517	3,462	-	50	5	-
	2020	**8,342**	**2,030**	**6,237**	**13**	**14**	**48**
Operasi *Operation*	2015	26,215	16,851	335	620	8,322	87
	2017	28,646	17,161	352	1,596	8,633	903
	2018	13,553	9,212	74	373	3,867	27
	2019	7,133	4,056	15	455	2,563	43
	2020	**20,571**	**10,370**	**73**	**1,698**	**8,387**	**43**

Nota: Berdasarkan kepada Laporan Penyiasatan Perbelanjaan Perlindungan Alam Sekitar, Malaysia, 2021 dan Banci Ekonomi 2016: Pematuhan Alam Sekitar

Notes: Based on Report on the Survey of Environmental Protection Expenditure, Malaysia, 2021 and Economic Census 2016: Environmental Compliance

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

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:

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 menghidap 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

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

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 Bekalan air minum haiwan ternakan *Fishery III – Tolerant species with common of economic value 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 *CLASS 1*	KELAS 2 *CLASS 2*	KELAS 3 *CLASS 3*	KELAS E *CLASS E*
	Kegunaan *Uses*	Pemeliharaan, kawasan dilindungi, Taman Laut *Preservation, marine protected areas, Marine Parks*	Kehidupan laut, Perikanan, Terumbu Karang, Rekreasi dan Marikultur *Marine Life, Fisheries, Coral Reefs, Recreational and Mariculture*	Pelabuhan, Lapangan Minyak & Gas *Ports, Oil & Gas Fields*	Paya Bakau & Muara Sungai *Mangroves, Estuarine & River-mouth Water*
1	Suhu (°C) *Temperature*	≤2 °C peningkatan terhadap ambien maksimum *≤2 °C increase over maximum ambient*			
2	Oksigen Terlarut (mg/L) *Dissolved Oxygen*	>80% tepu *>80% saturation*	5	3	4
3	Jumlah Pepejal Terampai* (mg/L) *Total Suspended Solid*	25 mg/L atau ≤ 10% peningkatan dalam purata bermusim, yang mana lebih rendah *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 *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 *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 *100 mg/L or ≤ 30% increase in seasonal average, whichever is lower*
4	Minyak dan Geris (mg/L) *Oil and Grease*	0.01	0.14	5	0.14
5	Raksa*(µg/L) *Mercury*	0.04	0.16 (0.04)	50	0.5
6	Kadmium*(µg/L) *Cadmium*	0.5	2 (3)	10	2
7	Kromium (VI) (µg/L) *Chromium*	5	10	48	10
8	Kuprum (µg/L) *Copper*	1.3	2.9	10	2.9
9	Arsenik (III)* (µg/L) *Arsenic*	3	20(3)	50	20(3)
10	Plumbum (µg/L) *Lead*	4.4	8.5	50	8.5
11	Zink (µg/L) *Zinc*	15	50	100	50
12	Sianida (µg/L) *Cyanide*	2	7	20	7
13	Ammonia (tidak terion) (µg/L) *Ammonia (unionized)*	35	70	320	70
14	Nitrit (NO_2) (µg/L) *Nitrite (NO_2)*	10	55	1,000	55
15	Nitrat (NO_3) (µg/L) *Nitrate (NO_3)*	10	60	1,000	60
16	Fosfat (µg/L) *Phosphate*	5	75	670	75
17	Fenol (µg/L) *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, Kelantan, 2019-2021
Water quality status by stations, Kelantan, 2019-2021

Negeri *State*	Lembangan *Basin*	Sungai *River*	Nombor stesen *Station number*	Nilai IKA / *WQI value*			Kategori IKA/ *WQI category* (2021)
				2019	2020	2021	
Kelantan	Sg. Golok	Sg. Golok	4DGLK002	87	86	93	B/C
		Sg. Golok	4DGLK003	90	94	97	B/C
		Sg. Golok	4DGLK004	82	87	93	B/C
		Sg. Golok	4DGLK005	86	89	93	B/C
		Sg. Golok	4DGLK006	84	86	91	B/C
		Sg. Jedok	4DGLK008	88	90	95	B/C
		Sg. Lanas	4DGLK007	86	84	94	B/C
		Sg. Tasik Garu	4DGLK002	87	86	93	B/C
	Sg. Kelantan	Sg. Aring	4DKLT013	76	79	80	ST/SP
		Sg. Belatop	4DKLT020	80	83	89	B/C
		Sg. Belatop	4DKLT021	86	87	96	B/C
		Sg. Belatop	4DKLT046	74	78	82	B/C
		Sg. Ber	4DKLT018	84	87	91	B/C
		Sg. Berok	4DKLT016	79	81	83	B/C
		Sg. Berok	4DKLT019	82	88	90	B/C
		Sg. Berok	4DKLT022	81	81	84	B/C
		Sg. Betis	4DKLT017	84	86	93	B/C
		Sg. Chiku	4DKLT037	83	88	88	B/C
		Sg. Chiku	4DKLT043	87	89	90	B/C
		Sg. Galas	4DKLT014	83	89	89	B/C
		Sg. Galas	4DKLT031	86	89	90	B/C
		Sg. Galas	4DKLT032	87	87	92	B/C
		Sg. Galas	4DKLT033	79	84	81	B/C
		Sg. Galas	4DKLT034	81	82	79	ST/SP
		Sg. Isos	4DKLT049	73	73	73	ST/SP
		Sg. Kelantan	4DKLT001	82	82	83	B/C
		Sg. Kelantan	4DKLT006	78	78	87	B/C
		Sg. Kelantan	4DKLT010	81	84	83	B/C
		Sg. Kelantan	4DKLT045	78	80	84	B/C
		Sg. Kelantan	4DKLT054	87	88	89	B/C
		Sg. Kelantan	4DKLT055	85	85	93	B/C
		Sg. Kelantan	4DKLT056	78	81	83	B/C
		Sg. Kelesa	4DKLT015	84	87	94	B/C
		Sg. Kenkren	4DKLT047	88	92	93	B/C

Status kualiti air sungai mengikut stesen, Kelantan, 2019-2021 (samb.)
Water quality status by stations, Kelantan, 2019-2021 (cont'd)

Negeri *State*	Lembangan *Basin*	Sungai *River*	Nombor stesen *Station number*	Nilai IKA / *WQI value*			Kategori IKA/ *WQI category* (2021)
				2019	2020	2021	
Kelantan	Sg. Kelantan	Sg. Kerilla	4DKLT002	87	92	94	B/C
		Sg. Kerilla	4DKLT003	90	91	94	B/C
		Sg. Ketil	4DKLT036	86	90	97	B/C
		Sg. Ketil	4DKLT053	84	90	96	B/C
		Sg. Lebir	4DKLT026	89	92	94	B/C
		Sg. Lebir	4DKLT027	78	85	87	B/C
		Sg. Lebir	4DKLT028	85	88	94	B/C
		Sg. Lebir	4DKLT029	82	84	87	B/C
		Sg. Lebir	4DKLT058	85	88	95	B/C
		Sg. Muring	4DKLT059	84	85	92	B/C
		Sg. Nal	4DKLT007	89	89	93	B/C
		Sg. Nal	4DKLT008	85	88	91	B/C
		Sg. Nal	4DKLT009	85	87	91	B/C
		Sg. Nenggiri	4DKLT023	82	82	83	B/C
		Sg. Nenggiri	4DKLT024	80	83	86	B/C
		Sg. Nenggiri	4DKLT025	80	80	78	ST/SP
		Sg. Pehi	4DKLT011	87	88	92	B/C
		Sg. Pehi	4DKLT044	88	86	90	B/C
		Sg. Pelaur	4DKLT048	88	90	96	B/C
		Sg. Penangau	4DKLT050	82	78	87	B/C
		Sg. Pergau	4DKLT004	93	91	96	B/C
		Sg. Pergau	4DKLT005	89	90	95	B/C
		Sg. Pergau	4DKLT038	92	94	96	B/C
		Sg. Pergau	4DKLT039	92	94	97	B/C
		Sg. Pergau	4DKLT040	93	94	97	B/C
		Sg. Pergau	4DKLT041	87	90	94	B/C
		Sg. Pergau	4DKLT051	92	91	96	B/C
		Sg. Pergau	4DKLT052	88	92	94	B/C
		Sg. Rasau	4DKLT061	81	80	80	ST/SP
		Sg. Relai	4DKLT012	83	90	91	B/C
		Sg. Relai	4DKLT030	86	88	91	B/C
		Sg. Sokor	4DKLT042	83	86	89	B/C
		Sg. Tuang	4DKLT035	87	90	94	B/C

Status kualiti air sungai mengikut stesen, Kelantan, 2019-2021 (samb.)
Water quality status by stations, Kelantan, 2019-2021 (cont'd)

Negeri *State*	Lembangan *Basin*	Sungai *River*	Nombor stesen *Station number*	Nilai IKA / *WQI value*			Kategori IKA/ *WQI category* (2021)
				2019	2020	2021	
Kelantan	Sg. Kemasin	Sg. Gali	4DKMS006	76	79	75	ST/SP
		Sg. Kemasin	4DKMS001	83	84	90	B/C
		Sg. Kemasin	4DKMS003	73	75	76	ST/SP
		Sg. Semerak	4DKMS002	84	85	91	B/C
		Sg. Semerak	4DKMS004	83	86	89	B/C
		Sg. Semerak	4DKMS005	88	80	77	ST/SP
	Sg. Pengkalan Chepa	Sg. Alor B	4DPCH003	48	65	63	ST/SP
		Sg. Alor Lintah	4DPCH004	61	76	68	ST/SP
		Sg. Keladi	4DPCH002	78	76	84	B/C
		Sg. Pengkalan Chepa	4DPCH005	50	68	70	ST/SP
		Sg. Pengkalan Chepa	4DPCH006	69	75	82	B/C
		Sg. Raja Gali	4DPCH001	73	79	87	B/C
	Sg. Pengkalan Datu	Sg. Pasir Hor	4DPDT004	67	73	77	ST/SP
		Sg. Pengkalan Datu	4DPDT001	76	83	86	B/C
		Sg. Pengkalan Datu	4DPDT002	73	83	87	B/C
		Sg. Pengkalan Datu	4DPDT003	77	86	86	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, Kelantan, 2019-2021
Marine water quality status for coastal, Kelantan, 2019-2021

Negeri *State*	Kawasan *Area*	Nilai IKAM *MWQI Value*			Kategori *Category* (2021)
		2019	2020	2021	
Kelantan	Pantai Seri Tujuh	88	84	93	Terbaik/ *Excellent*
	Pantai Cahaya Bulan	87	92	95	Terbaik/ *Excellent*
	Pantai Sabak	88	89	95	Terbaik/ *Excellent*
	Pantai Irama Bachok	89	66	95	Terbaik/ *Excellent*
	Pantai Bisikan Bayu	95	83	95	Terbaik/ *Excellent*
	Pantai Melawi	85	83	95	Terbaik/ *Excellent*

Sumber: Jabatan Alam Sekitar
Source: Department of Environment

Status kualiti air marin di kawasan muara sungai, Kelantan, 2019-2021
Marine water quality status for estuary, Kelantan, 2019-2021

Negeri *State*	Kawasan *Area*	Nilai IKAM *MWQI Value*			Kategori *Category* (2021)
		2019	2020	2021	
Kelantan	Kuala Sungai Golok	58	59	79	Sederhana/ *Moderate*
	Kuala Sungai Kelantan	55	58	70	Sederhana/ *Moderate*
	Kuala Sungai Pengkalan Chepa	53	56	64	Sederhana/ *Moderate*
	Kuala Sungai Pengkalan Datu	68	59	59	Sederhana/ *Moderate*
	Kuala Sungai Kemasin	39	56	59	Sederhana/ *Moderate*
	Kuala Sungai Semerak	69	59	85	Baik/*Good*

Sumber: Jabatan Alam Sekitar
Source: Department of Environment

Status kualiti air marin di kawasan pulau, Kelantan, 2019-2021
Marine water quality status for island, Kelantan, 2019-2021

Negeri *State*	Kawasan *Area*	Nilai IKAM *MWQI Value*			Kategori *Category* (2021)
		2019	2020	2021	
Kelantan	Panjang	82	77	92	Terbaik/ *Excellent*
	Kundur	84	84	92	Terbaik/ *Excellent*

Sumber: Jabatan Alam Sekitar
Source: Department of Environment

NOTA DAN SIMBOL
NOTES AND SYMBOLS

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

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

NOTA
NOTE

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

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 50ha. 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.*

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 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 lengkap 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 dengan pokok-pokok yang lebih tinggi daripada 5 meter dan litupan kanopi melebihi 10%, 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 5 metres with a tree canopy cover of more than 10 per cent. 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 lebih kecil dan ditutup dengan lapisan tanah pada penghujung waktu operasi 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 each day's 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.*

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