

Geography, Environment and Population

Location

The Macao Special Administrative Region (MSAR) is an integral part of the People's Republic of China. Situated at the mouth of the Pearl River Delta (PRD) and bordering Guangdong Province, Macao is 60 kilometres from Hong Kong, and the time is eight hours ahead of Greenwich Mean Time. The MSAR comprises the Macao peninsula and two islands: Taipa and Coloane. Its origin point is located at latitude 22°22'40"N and longitude 113°32'22"E. Three bridges – Nobre de Carvalho Bridge, Friendship Bridge (Ponte da Amizade) and Sai Van Bridge – link the peninsula to Taipa; while the COTAI Reclamation Area links Taipa and Coloane islands.

According to Chief Executive Notice No.128/2015 dated 20 December 2015: as stipulated in Order No. 665 of the State Council of the People's Republic of China, the Macao Special Administrative Region comprises land and marine areas, with the land area comprising the Border Gate Macao Checkpoint Building section and the Canal dos Patos section, and the marine area comprising six sections: the Inner Harbour section, Cotai channel section, southern Macao waters section, eastern Macao waters section, artificial island section, and northern Macao waters section. The boundary to the west is meridian 113°31'41.4"E, to the east 113°37'48.5"E, to the south parallel 22°04'36.0"N, and to the north 22°13'01.33"N.

Area

Due to reclamation along its coastline, Macao's total land area has grown from 11.6 square kilometres in 1912, when measurements were first taken, to 33.3 square kilometres in 2022. The Macao peninsula accounts for 9.3 square kilometres (28.0 percent) of the current area; Taipa island for 7.9 square kilometres (23.7 percent); Coloane island for 7.6 square kilometres (22.8 percent); COTAI Reclamation Area for 6.1 square kilometres (18.3 percent); New Urban Zone Area A for 1.4 square kilometres (4.2 percent); New Urban Zone Area C for 0.3 square kilometres (0.9 percent); Macao border crossing area on Zhuhai-Macao checkpoint on the Artificial Island of the Hong Kong-Zhuhai-Macao Bridge for 0.7 kilometres (2.1 percent), and the campus of the University of Macau for one square kilometre.

According to Chief Executive Notice No.128/2015 dated 20 December 2015: as stipulated in Order No. 665 of the State Council of the People's Republic of China, the Central People's Government explicitly determines that the area of waters of the Macao Special Administrative Region is 85 square kilometres.

Geology and Topography

Macao mainly comprises flat land, terraces and hills. The area of flat land (including reclaimed land) is 24.2 square kilometres, accounting for 72.7 percent of the total; granite hills cover six square kilometres, or 18 percent; and terraces cover 1.2 square kilometres, or 3.6 percent. The terraces are historically areas of denudation, extending along St Augustine, Luis de Camoes Garden, the hill behind Mong Ha Kun Iam Tong Temple, Russa Hill, and the southern part of Taipa island. Their relatively small area, low elevation (20-25 metres) and gentle slopes mean that most of the terraces

are fully utilised. The remaining land – including reserves, monument sites and forests – occupies approximately 1.9 square kilometres, accounting for 5.7 percent of the total land area.

The elevation of Macao increases from the north to the south. Guia Hill, in the north, is the highest point on the Macao peninsula, with an altitude of 90 metres. To the south, Alto de Coloane is the highest hill on Coloane island, as well as the highest point in Macao, with an altitude of 170.6 metres. Taipa Grande, the main peak of Taipa island, has an altitude of 158.2 metres.

Coastline Assessment

According to Executive Order No. 184/2018, the coastline of the Macao SAR was determined by the published Macao Special Administrative Region Coastline Map, dated 1 July 2017. The total length of Macao's coastline is 76.7 kilometres, 18.4 kilometres of which are around the Macao peninsula; 49.9 kilometres are around the two islands (including Taipa Island, Cotai Reclamation Area and Coloane Island); 5.7 kilometres are around New Urban Zone Area A; 2.7 kilometres are around the Macao border crossing area on Zhuhai-Macao Port Artificial Island of the Hong Kong-Zhuhai-Macao Bridge.

There are two types of coastline in the Macao SAR: artificial and natural coastlines. Artificial coastlines predominate, representing 81.5 percent of the total coastline length, and are mainly around the Macao peninsula and fringing eastern and northern Taipa Island. The natural coastlines mainly fringe western Taipa Island and the southern tip of Coloane Island, representing 18.5 percent of the total coastline length.

Climate

Macao is situated in a subtropical zone, with the Asian continent to the north and a wide tropical sea to the south. In winter, Macao experiences northerly winds, cold and dry weather and low rainfall, due to a cold continental high-pressure system at medium and high latitudes. In summer, Macao is mainly subject to south-westerly winds, hot and wet weather and heavy rainfall, due to the influence of oceanic tropical weather systems. The reverse of wind directions in winter and summer, together with minimal temperature variations during the day, give Macao a marine monsoon climate.

According to the climate normals of the World Meteorological Organisation (WMO), calculated with 30 years of data, the average annual precipitation in Macao between 1981 and 2010 was more than 2,000 millimetres, with most rainfall occurring between April and September. June had the most precipitation – an average of 373.7 millimetres; while December had the least – an average of 31.3 millimetres.

Macao has an average annual temperature of 22.8°C. The coolest month is January, when it averages 15.2°C. Most years, Macao has a short cold weather period when temperatures fall below 5°C. The average monthly temperature exceeds 22°C during seven months of the year, indicating that Macao has a short winter but a long summer.

Macao is frequently hit by typhoons. The typhoon season starts in May and ends in October, with July to September as its peak period.

Weather Overview

General Information

In 2022, Macao's average annual temperature and the total rainfall fell within the climate normal; the relative humidity was slightly higher than the climate normal.

Six tropical cyclones affected Macao in 2022. They were Typhoon Chaba from 29 June to 3 July, a tropical depression from 3 August to 4 August, Tropical Storm Mulan from 8 August to 11 August, Typhoon Ma-on from 23 August to 25 August, Typhoon Nesat from 16 October to 18 October, and Typhoon Nalgae from 31 October to 3 November. Two new records were set in 2022: Typhoon Chaba set a record for the longest duration of Typhoon Signal No. 8 hoisted in July of Macao (23 hours); and Typhoon Nalgae marked the first time since 1972 that Typhoon Signal No. 8 was hoisted in November (2 November).

Regarding storm surge warnings, as a result of Typhoon Chaba, Tropical Storm Mulan, Typhoon Ma-on and Typhoon Nalgae, one Orange Storm Surge Warning, three Yellow Storm Surge Warnings and four Blue Storm Surge Warnings were issued in 2022, during which Typhoon Chaba caused the most severe flooding, with the maximum flood height of 0.5 metres recorded in the early hours of 2 July in the south of the Inner Harbour.

A total of 27 rainstorm warnings were issued in Macao in 2022, including the Red Rainstorm Warning Signal in the morning of 11 May, in the afternoon of 12 May, at midnight on 7 June, in the morning of 8 June, at midnight on 10 August and in the evening of 7 October. During the Red Rainstorm Warning that was effective in the early morning of 8 June, East Asian Games Station recorded the highest hourly cumulative rainfall (67.6 millimetres), which was the third highest in June since 2000, and the highest daily cumulative rainfall (236.2 millimetres) in 2022.

Summary of Severe Weather Warnings Issued in 2022			
Warning / Signal Type		Frequency	No. of Warning Reports Issued
Tropical Cyclone Warning	No. 1 Alert Signal	6	29
	No. 3 Strong Wind Signal	9	60
	No. 8 Northeast Gale Signal	1	4
	No. 8 Southeast Gale Signal	3	36
	No. 8 Southwest Gale Signal	0	0
	No. 8 Northwest Gale Signal	1	9
	No. 9 Increasing Gale Signal	0	0
	No. 10 Typhoon Signal	0	0
	All Signals Lowered	6	6

(Cont.)

Summary of Severe Weather Warnings Issued in 2022			
Warning / Signal Type		Frequency	No. of Warning Reports Issued
Strong Monsoon Warning (Black Ball)		17	64
Rainstorm Warnings	Yellow Rainstorm Warning Signal	29	64
	Red Rainstorm Warning Signal	6	13
	Black Rainstorm Warning Signal	0	0
	All Warnings Lowered	27	27
Thunderstorm Warning		54	146
Storm Surge Alert		0	0
Storm Surge Warning	Blue Storm Surge Warning	4	12
	Yellow Storm Surge Warning	3	9
	Orange Storm Surge Warning	1	4
	Red Storm Surge Warning	0	0
	Black Storm Surge Warning	0	0
	All Warnings Lowered	4	4

Temperatures

Macao had an average annual temperature of 22.7°C during 2022, which was 0.1°C lower than the climate normal and fell within the normal level. The highest and the lowest average temperatures were 29.1°C in July, and 13.6°C in February, respectively.

September was the hottest month, with a record high average temperature of 28.8°C, identical to the same month in 2021. It had the second highest number of hot days on record, with 16 days, and the highest number of hot nights on record, with four days in September. The number of hot days for the year was 38, seven days slightly more than the climate normal of 31 days. In addition, the year recorded the lowest average temperature on record for the month of May, at 24°C, and the lowest single day temperature in May, at 14.9°C. The number of cold days in the year was 43, similar to the climate normal of 39 days, but January saw the fewest number of cold days ever, with only six days.

The hottest day was 24 July, when the temperature rose to 37.4°C; whereas the coldest day was 21 February, when the temperature fell to 6°C.

Relative Humidity

The average relative humidity during 2022 was 82 percent, which was two percentage points higher than the climate normal. June and November saw the highest monthly average relative humidity, at 89 percent; whereas the lowest was 69 percent in October and December.

Rainfall

Total rainfall during 2022 was at a normal level of 2,030.8 millimetres; and was 64.2 millimetres, or about three percent above climate normal. The highest monthly rainfall was 514.6 millimetres, recorded in May, 228.6 millimetres above normal. Only 6.8 millimetres of rainfall was recorded in April, marking the lowest monthly rainfall of the year. The highest daily rainfall was 213.8 millimetres, on 8 June.

Evaporation

The total evaporation level in 2022 was 795.1 millimetres. Other than March, April, September and October, the monthly evaporation levels were slightly below the climate normal.

Sunshine

During 2022, Macao had 1,895.1 hours of sunshine. The most hours of sunshine were recorded in April, totalling 179.5 hours, which was 85.3 hours above the climate normal for that month. The least hours of sunshine were recorded in November, amounting to 100.4 hours, which was 57.7 hours fewer than the climate normal for that month.

Wind

During 2022, Macao was subject to predominantly north-northeasterly winds in January; northerly winds in February, November and December; east-southeasterly and south-southeasterly winds in March; south-southeasterly winds in April, May and August; southerly winds in June and July; and easterly winds in September and October. Wind speeds averaged 11.4 kilometres per hour.

Meteorological and Geophysical Services

Meteorological and Geophysical Bureau

The Meteorological and Geophysical Bureau (SMG) is supervised by the Secretary for Transport and Public Works. It provides weather reports, monitors air quality and radiation, and conducts research into climate, climate change and earthquakes.

Apart from hourly real-time weather information, the SMG issues various types of daily weather forecasts for the public, government departments and private institutions. These include five weather reports and forecasts, two marine and weather forecasts for the Macao coastal area, as well as daily

weather reports over the past year, which are broadcast daily for the public.

The SMG also provides a 48-hour automatic weather forecast service, which gives hourly forecasts of temperature, humidity, wind speed, wind direction and weather conditions for the next two days on its website and mobile apps for public reference.

The SMG continues cooperating with the Macao Broadcasting Company (TDM). Every day, SMG officers explain the day's weather conditions and the forecast for the following day during the Macao Broadcasting Company's morning TV programme. The SMG forecasters also record weather information regularly, or when necessary, and upload it to the Internet for download and use by various media. This information includes a weather review of the day, a two-day weather forecast and air quality report; a weekly weather forecast; and special weather information (on typhoons, rainstorms, very hot and cold weather).

In response to special weather conditions (such as tropical cyclones that appear likely to enter the South China Sea, heavy rainstorms and significant changes in temperature), the SMG sends special weather notifications to registered users, social welfare organisations and schools via WeChat, mobile apps, SMS and the Meteorological and Geophysical Bureau Telegram Channel.

Whenever a tropical cyclone develops in the northwest Pacific Ocean, the SMG monitors and produces a forecast track reporting its location and intensity in real time and for the next 120 hours. When a tropical cyclone signal is required, the SMG provides a warning signal forecast for the following one to two days, based on a table with forecasts for tropical cyclones and storm surges that is released on its official website. Citizens can learn about the potential impact of tropical cyclones during particular hours and make necessary preparations as soon as possible. When Typhoon Signal No.3 or above is issued, TDM uses split-screen views to announce the latest tropical cyclone news.

The SMG also worked with relevant departments to show the latest weather warnings on electronic display screens in the Border Gate checkpoint building and the Outer Harbour Ferry Terminal, such as tropical cyclone and rainstorm warnings, to keep passengers informed regarding the weather.

In recent years, the SMG has continued to enhance its weather forecasts by issuing qualitative forecasts of severe weather through special push notifications or special weather information one to two days in advance, where feasible, to alert the public of possible weather changes in the near future. In addition, the bureau makes reference to the weather nowcasting system, together with other forecasts or real-time data, to issue early warning alerts and weather warnings one to two hours before the impact of severe weather, so that the public can be prepared in advance.

The Tsunami Warning System developed by the SMG in 2022 came into effect on 1 January 2023.

The SMG has established the Aeronautic Meteorological Center at Macao International Airport to provide aviation weather services for airport operators and flight crews. All international flights departing Macao can receive the most up-to-date, international standard aeronautical meteorological documents via the Aviation Weather Information System (AWIS). In 2022, the system typically operated at 100 percent efficiency.

During the fourth quarter of 2021, the SMG Aeronautic Meteorological Center expanded the

service provided to users by issuing airport weather warnings (including thunderstorm warnings and strong wind warnings) and alerts regarding severe convective weather at the airport, via Telegram.

The SMG strives to promote meteorological science and disaster relief knowledge to different groups, including through producing informative images, texts and videos; broadcasting promotional videos and audios through various channels; receiving visits from groups; inviting members of the civil protection mechanism and school administrators on field exchanges; and collaborating with the Science Museum to organise activities such as the “Campus Weather Monitoring Competition”, a play on the “Tricolour Rainstorm Warnings”, the “Weather Fun Families Tour” and the Science Museum summer courses.

In 2022, a total of 2,758 participants enjoyed the play on “Tricolour Rainstorm Warnings”. Due to the pandemic, the number of visitors to SMG decreased to 1,084, with a total of group 35 visits throughout the year.

To keep the public informed of potential flooding areas and flood heights during various storm surge warnings, the SMG has posted and regularly updated the Storm Surge Alert labels on the 130 Civil Protection CCTV poles in low-lying areas and outside the entrances of over 40 social service facilities under the Social Welfare Bureau.

Monitoring Network

The SMG collects weather data 24 hours a day via its Automatic Weather Station Network comprising 17 weather-observation stations in key locations around Macao, 14 of which provide real-time meteorological information to the public, while stations in Mount Fortress, Taipa Grande and Ka Ho automatically send information every 15 minutes to destinations worldwide using the international SYNOP code and the Global Telecommunications System (GTS). This forms part of the Pearl River Delta Real-time Automatic Weather Station Network, which was jointly established to exchange meteorological data by the Guangdong Provincial Meteorological Bureau, the Hong Kong Observatory and the Macao SMG.

The SMG has added a centralised lightning information processing system, and set up a lightning detection station at the University of Macao, to optimise the efficiency, quality and stability of lightning monitoring.

Regarding meteorological telemetry, the SMG has two ground meteorological reception and processing systems to receive Japanese Himawari satellite information and Chinese FY-2 and FY-4 satellite information, respectively; two dual-polarisation Doppler weather radars; three low-level wind profilers; two microwave radiometers; two cloud height meters; four visibility measuring devices; and two lightning sensors to monitor lightning in the skies over Macao and the vicinity. In addition, the SMG joined hands with the Zhuhai Meteorological Bureau to install four X-band phased array weather radars in Zhuhai, forming a network of phased array radars to monitor weather conditions over Macao and nearby regions. In terms of meteorological analysis systems, the SMG owns an integrated analysis system for tropical cyclones and storm surges, an ensemble system for predicting storm surges in Macao, and a weather nowcasting system, to analyse the impacts of tropical cyclones and storm surges, and monitor real-time changes in thunderstorms.

The SMG cooperates with related departments to establish the Water Level and Tide Monitoring Network, to provide round-the-clock real time data on flooding and tides in flooding black spots and coastal area. The network includes 20 land water level monitoring stations set up at flooding black spots in various districts of Macao (with 18 of these stations providing real-time flooding information to the public), and two tide monitoring stations set up along the coast.

In addition, the SMG cooperated with the Pearl River Water Resources Research Institute to commence work on marine meteorological observations. Real-time monitoring data was received from the marine buoy stations in the Macao and Pearl River Water regions, expanding monitoring from land-based meteorology to include nearby sea areas, including hydrology, and providing real-time data as a reference for storm surge monitoring and issuing alerts.

Air quality monitoring

The SMG established the Air Quality Monitoring Project in partnership with Companhia de Electricidade de Macau (CEM). The SMG employs a fully automated air monitoring network to effectively measure major pollutants that jeopardise Macao's air quality. Macao has six automatic air quality monitoring stations, a volatile organic compound monitoring system, and an aerosol light detection and ranging (LIDAR) system for monitoring aerosol conditions and mixing layers above Macao.

Seismological monitoring

The SMG has a seismological monitoring station in its Taipa Grande headquarters on Taipa, equipped with a deep shaft (30 metres below ground level) digital seismograph. In 2014, the deep shaft digital seismograph was upgraded and became a monitoring station of the Pearl River Delta Earthquake Early Warning Network. In addition, a seismic information sharing portal was introduced, to receive earthquake information for the entire country. In 2020, the SMG Taipa Grande headquarters was equipped with a strong motion seismograph, and introduced an earthquake-induced tsunami forecast system.

Environmental radiation monitoring

The SMG's headquarters is equipped with an environmental radiation monitoring station, mainly for detecting Gamma radiation dose rates in the atmosphere and announcing the results on the website. A baseline survey on Macao's atmospheric radiation began in 2013. Regular monitoring of Macao's atmospheric radiation is then conducted every year in different districts. To enhance monitoring of radiation in the atmosphere, a radiation monitoring station was built on the Hengqin campus of the University of Macao, and inspections of this were completed by the end of 2022.

Regional and International Cooperation

The SMG is a member of the WMO. It actively participates in promoting technology, research,

training and applications relating to meteorology. Every year, it sends delegations to meetings, seminars, workshops and training programmes arranged by the WMO, mainland China and overseas meteorological agencies and academic organisations.

The SMG is also a member of the ESCAP/WMO Typhoon Committee. The committee secretariat moved to Macao in 2007.

The SMG keenly takes part in meteorological science meetings and exchange activities conducted by its mainland China and overseas counterparts. Domestic meetings included the Guangdong-Hong Kong-Macao Seminar on Meteorological Science and Technology and the Guangdong - Hong Kong - Macao Meeting on Cooperation in Meteorological Operations organised alternately by the three parties.

Regional and international meetings included:

- The 54th Session of ESCAP/WMO Typhoon Committee;
- The Second Session of the Commission for Observation, Infrastructure and Information Systems (INFCOM) of WMO;
- The Second Session of the Commission for Weather, Climate, Water and Related Environmental Services and Applications;
- The 18th Session of the Forum on Regional Climate Monitoring-Assessment-Prediction for Asia (FOCRAII);
- The 26th Meeting of the Meteorology Sub-group of the Asia Pacific Air Navigation Planning and Implementation Regional Group;
- The 17th Typhoon Committee Integrated Workshop and Roving Seminar; and
- The 11th Meteorological Technical Conference among China, Macao and Portugal.

Air Quality

Population density, scarcity of land, narrow streets and busy traffic all affect Macao's air quality. However, this is offset to some extent by the low discharge of industrial pollutants. The air quality is therefore generally quite good. Every winter, a comparatively high level of airborne pollutants raises the air pollution index; while in summer the air quality improves, with lower pollution index readings, as the convective precipitation of the tropical climate dispels pollutants.

The SMG revised the definition of the Air Quality Index (AQI) in accordance with the published "Macao Environmental Quality Standards - Ambient Air Quality Standards (trial version)"; the revised AQI was officially adopted from 1 January 2021. The new index further restricts the concentrations of pollutants corresponding to each air quality level, and improves the related preventive measures, and is disseminated hourly via the SMG website and mobile app.

During 2022, roadside monitoring stations in Macao recorded "good" air quality on 74.0 percent of days, "acceptable" air quality on 23.8 percent of days, and "poor" air quality on 2.2 percent of

days (eight days). In the high-density residential areas of the Macao peninsula, the air quality was “good” on 59.2 percent of days, “acceptable” on 36.4 percent of days, and “poor” on 4.4 percent of days (16 days).

In the high-density residential area on Taipa, the air quality was “good” on 57.8 percent of days, “acceptable” on 39.5 percent of days, and “poor” on 2.7 percent of days (10 days). Ambient monitoring stations on Taipa recorded “good” air quality on 47.1 percent of days, “acceptable” air quality on 44.7 percent of days, “poor” air quality on 7.4 percent of days (27 days), and “very poor” air quality on 0.8 percent of days (three days).

Ambient monitoring stations on Coloane recorded “good” air quality on 48.2 percent of days, “acceptable” air quality on 42.2 percent of days, “poor” air quality on nine percent of days (33 days), and “very poor” air quality on 0.6 percent of days (two days). The Ka Ho roadside monitoring station recorded “good” air quality on 52.3 percent of days, “acceptable” air quality on 41.4 percent of days, “poor” air quality on six percent of days (22 days), and “very poor” air quality on 0.3 percent of days (one day).

In 2022, ozone (O₃) was the main pollutant that led to “poor” or “very poor” air quality in Macao, primarily affecting Macao in summer and autumn. The Coloane ambient monitoring stations recorded most of the “poor” or “very poor” air quality days – 35 days, representing 9.6 percent of the year. Overall, over 88 percent of days met the air quality standards (“good” to “acceptable”) across various districts in 2022.







Average Pollutant Concentrations in 2022

Monitoring Station	Respirable suspended particulates (µg/ m3)	Fine suspended particulates* (µg/ m3)	Sulphur dioxide (µg/ m3)	Nitrogen dioxide (µg/ m3)	Ozone (µg/ m3)	Carbon monoxide (mg/m3)
Roadside	35.4	16.9	---	40.3	---	1.0
High-density residential area of Macao peninsula	40.9	14.8	5.2	35.5	44.5	0.7
High-density residential area of Taipa island	45.6	13.7	5.5	25.3	44.4	0.7
Taipa ambient	29.6	15.0	3.5	19.8	63.6	0.6
Coloane ambient ⁽ⁱ⁾	31.4	15.8	3.7	22.9	65.3	0.7
Ka Ho roadside ^a	31.8	13.5	4.6	19.9	58.6	0.6

Comparisons between Pollutant Concentrations and the Daily Air Pollution Index (adopted since 1 January 2021)

Air quality index	Respirable suspended particulates 24-hour average ($\mu\text{g}/\text{m}^3$)	Fine suspended particulates 24-hour average ($\mu\text{g}/\text{m}^3$)	Sulphur dioxide 24-hour average ($\mu\text{g}/\text{m}^3$)	Nitrogen dioxide 24-hour average ($\mu\text{g}/\text{m}^3$)	Ozone 8-hour average ($\mu\text{g}/\text{m}^3$)	Carbon monoxide 8-hour average (mg/m^3)
0	0	0	0	0	0	0
50	50	25	20	100	80	5
100	100	50	50	200	160	10
200	250	115	150	700	240	17
300	350	150	475	1,200	400	34
400	420	250	800	2,000	600	46
500	500	350	1,600	2,500	800	57

Air Pollution Index

Air quality index	0 ~ 50	51 ~ 100	101 ~ 200	201 ~ 300	301 ~ 400	401 ~ 500
Air quality level (defined by Macao standards)	 Good	 Acceptable	 Poor	 Bad	 Severe	 Harmful

Environment

Environmental Protection Bureau

The Environmental Protection Bureau (DSPA) is a public department in charge of studying, planning, executing, coordinating and promoting environment policies.

Advisory Council on the Environment

The Advisory Council on the Environment is chaired by the Director of the Environmental Protection Bureau. Members include a maximum of seven representatives of other entities or government

departments, and a maximum of 20 other prominent social figures in the environmental protection field.

The major responsibility of the Advisory Council on the Environment is consulting different social sectors regarding Macao's environmental protection, and providing recommendations on the study, formulation, implementation, coordination and promotion of environmental policies.

Noise

There are many reasons for noise pollution in Macao. Urban characteristics – such as population density, busy traffic, narrow streets and the large number of high-rise buildings – create conditions for noise transmission.

In 2022, the Environmental Protection Bureau and the Public Security Police received 10,620 complaints about ambient noise, about 18.4 percent fewer than the 2021 figure. The Environmental Protection Bureau received 2,165 of these complaints, representing an increase of 3.6 percent compared with 2021; whereas the Public Security Police received the remaining 8,455 cases, 21.5 percent fewer than in 2021.

Complaints received by the Environmental Protection Bureau and the Public Security Police were primarily related to “activities of daily life and pets in residential buildings” (37.0 percent or 3,932 cases), “public areas” (27.7 percent or 2,947 cases), and “industry, commerce and services” (15.2 percent or 1,617 cases).

Environmental Noise Monitoring Network

In order to assess the ambient noise level in different districts, the DSPA has set up six environmental noise monitoring stations – three on the Macao peninsula, one on Taipa island, one in the COTAI reclamation area and one in Coloane. These monitoring stations conduct round-the-clock monitoring of ambient noise, road traffic noise, and noise from the residential zones, by means of an automated network.

The data is published on a monthly basis on the Environmental Protection Bureau's website and in the Environmental Geographic Information System. The 2021 Annual Report on Data Collected by Environmental Noise Monitoring Stations of Macao was published in March 2022.

Water Quality and Wastewater Treatment

Water Quality

Situated at the mouth of the Pearl River, Macao occupies a peninsula and nearby islands facing Lingdingyang to the east and the South China Sea to the south; there is a wide expanse of water. Water exchanges resulting from tidal flows dilute pollutants entering the area. The Inner Harbour to the west of Macao is a favourite berthing place for Zhuhai and Macao fishing boats. The sluice of the Zhuhai Qianshan River lies upstream of the Inner Harbour channel, and when this is closed the area is partially blocked off. The poor exchange of its waters with the sea results in conditions

in which pollutants can accumulate. When the sluice is open, Macao's water quality is determined by the quality of the water in the Qianshan River. Pollutants that have accumulated will then flow to neighbouring waters.

Based on the geographic features of Macao, the Public Health Laboratory of the Health Bureau adopts Category 3 Water Quality Standard of the Sea Water Quality Standard of China (GB3097-97), to assess individual indicators, nutrition indicators and comprehensive indicators of the water quality at each monitoring station.

Water Quality Monitoring Network

In 2022, the Environmental Protection Bureau continued monitoring the water quality of managed waters of Macao. The monitoring of sediments in Macao waters commenced in 2022, to provide a more comprehensive understanding of the marine environment. In addition, the Environmental Protection Bureau has set up three automatic environmental water quality monitoring stations – at Ilha Verde Dockyard, Inner Harbour and Cotai Nature Reserve. Round-the-clock monitoring of water quality is conducted through an automated network. The data is published monthly on the website of the Environmental Protection Bureau and in the Environmental Geographic Information System. The 2021 Annual Report on Data Collected by Automatic Water Quality Monitoring Stations of Macao was published in March 2022. In addition, in response to the remediation of the Canal dos Patos, the bureau took over management of the two automatic water quality monitoring stations in Canal dos Patos, to constantly monitor the water quality in the area.

Monitoring Drinking Water Quality

The Laboratory Division of the Municipal Affairs Bureau is responsible for the public water supply network; inspecting the water quality of public water sources and wells; and – if necessary – recommending the closure of these facilities in the public interest. It regularly monitors the quality of water processed by the water supply company, and the public water supply networks and reservoirs in the territory, to verify whether the quality complies with the requirements stipulated in the Rules and Regulations on Water Supply and Drainage in Macao (Decree-Law No. 46/96/M).

Since being awarded the ISO/IEC 17025 Certificate of Laboratory Accreditation by the China National Accreditation Committee for Laboratories (CNAL; now China National Accreditation Service for Conformity Assessment) in 2003, the Laboratory Division has enhanced its analytical performance and its quality management system. The laboratory also continued to participate in proficiency tests held by renowned organisations in mainland China and countries including the United States, the United Kingdom and Australia. The laboratory's inspection technology has fulfilled international requirements. Currently, it possesses 92 and 204 accreditations for water quality certificates and various food certificates, respectively.

Wastewater Management

The five sewage treatment facilities in Macao – the Macao Peninsula Sewage Treatment Plant, Taipa Sewage Treatment Plant, Coloane Sewage Treatment Plant, the Crossborder Industrial Zone

Sewage Treatment Plant, and the temporary sewage treatment plant near the Outer Harbour Ferry Terminal – can handle 365,000 cubic metres of sewage per day.

In 2022, the Macao Peninsula Sewage Treatment Plant handled 53,998,419 cubic metres of sewage; Taipa Sewage Treatment Plant handled 8,997,689 cubic metres; Coloane Sewage Treatment Plant handled 13,610,499 cubic metres; the Crossborder Industrial Zone Sewage Treatment Plant handled 776,673 cubic metres; and the temporary sewage treatment plant near the Outer Harbour Ferry Terminal handled 3,910,613 cubic metres.

The preliminary design and ground investigation for the in-situ enhancement of the Coloane Sewage Treatment Plant were completed, with an open tender to be held in 2023.

To tie in with the development of reclaimed water reuse by the MSAR Government, in 2022 the Environmental Protection Bureau completed the preliminary design of the sewage treatment plant on the Artificial Island of Hong Kong-Zhuhai-Macao Bridge, and made adjustments to the design, with a view to conducting an open tender in 2023.

To improve coastal water quality, the temporary sewage treatment plant near the Outer Harbour Ferry Terminal in Macao was completed and put into operation in late December 2021. The facility operations accorded with expectations. An open tender for construction of the temporary sewage treatment plant at Avenida Marginal do Lam Mao was held in December 2022, and the preliminary design work for the construction of the temporary sewage treatment plant at Inner Harbour South commenced in 2022.

Waste Management

Companhia de Sistemas de Resíduos, Lda. (CSR) has been contracted to undertake Macao's household waste collection and conveyance, urban cleaning operations and the cleaning and maintenance of public waste containers, under the Government's supervision. In 2022, the CSR collected about 284,309 tonnes of household waste in Macao.

To help implement the Macao Solid Waste Resources Management Programme (2017-2026) and promote the policy of "Waste reduction at source, sorting and recycling", the Environmental Protection Bureau launched the Recycling Industry Equipment and Vehicles Subsidy Scheme in 2018. This provides subsidies to the recycling industry for purchasing recycling equipment. The application process for the scheme closed on 25 November 2022.

In terms of plastic reduction, the Environmental Protection Bureau continued to promote plastic reduction through a series of activities such as the Green School Project, the Plan for Recognition of Eco-Supermarkets, the Macao Green Hotels Award, the "Reducing Plastic is Very Easy" and "Bringing Your Own Water Bottles is Easy" campaigns, and the Scheme for Food Waste Reduction During Macao Food Festival. Drinking water dispensers have been installed in suitable locations, to promote waste reduction at source among the public.

In addition, following the ban on the import of disposable styrofoam utensils, non-degradable plastic disposable drinking straws and disposable drink stirrers to MSAR, the Executive Order to Prohibit the Import of Non-degradable Disposable Plastic Knives, Forks and Spoons to the MSAR

was promulgated in September 2022.

To promote the separation and recycling of the “three-colour resources” (paper, plastic and metal/aluminium cans), the Environmental Protection Bureau continued expanding the community resources recycling network, to provide more accessible recycling channels – including the Environmental Protection Fun corners, the Environmental Protection Fun clean collection spots, the Environmental Protection Fun collection points, mobile recycling vehicles and smart recycling machines. The “Recycling in Buildings is Easy” programme was also launched, to promote participation by building residents. After pre-treatment, the recyclables are transported to neighbouring regions for recycling.

Regarding food waste recycling, the Environmental Protection Bureau launched the “Recycling Food Waste is Very Easy” campaign in 2021, and introduced a new household food waste collection service (excluding food waste from restaurants) in the Environmental Protection Fun corners. Over 15 tonnes of household food waste were collected by the end of 2022. The first “Smart Machine for Collection of Food Waste” was set up at the Environmental Protection Fun corner (Mong Ha) in 2022, to enable people to deposit food waste for recycling.

In addition, by the end of 2022 a total of 166 restaurants had participated in the Restaurant Food Waste Recycling Pilot Project, which continued collecting food waste from government departments, schools, associations and institutions through the Food Waste Treatment Demonstration Project. The collected food waste was transported to Macao Incineration Centre for centralised treatment through the food waste treatment machine and composting facility. After treatment, the food waste is converted to organic fertiliser to be distributed to the public and landscaping companies, free of charge. Over 100,000 small bags (100 grammes per bag) and 6,000 larger bags (20 kilogrammes per bag) of free fertiliser were distributed by the end of 2022.

In addition, the MSAR Government planned to build an organic resource recycling centre at the construction waste landfill, based on anaerobic digestion technology, to generate biogas for electricity generation. An open tender process was initiated in 2022.

In 2022, the Environmental Protection Bureau again organised the “Recycling Red Packets is Easy” event during Chinese New Year, setting up more than 900 collection points across Macao. About 2.30 million red packets were collected (weighing over 6.75 tonnes). After sorting, about 300,000 red packets (weighing over 0.8 tonnes) could be distributed to the public in the following year for reuse, while the rest were sent for recycling.

The Environmental Protection Bureau again organised the “Recycling Mooncake Boxes is Easy” event during Mid-Autumn Festival in 2022, the bureau set up over 1,063 mooncake box collection points across Macao, and 15,400 used mooncake boxes (weighing approximately 5.46 tonnes) were collected and recycled.

Macao Waste Incineration Centre

Macao Incineration Centre is responsible for processing all Macao’s solid waste. It comprises a new plant and an old plant, each with three incineration facilities, with a total processing capacity of 1,728 tonnes of waste per day. During 2022, the centre processed 505,967 tonnes of solid waste,

of which municipal solid waste amounted to 436,828 tonnes. The waste heat produced during the treatment of the municipal solid waste can be recovered and used for power generation. The power generated by the centre can supply up to 28.7MW per hour of electricity at full load, of which 7MW are used for operation, and the remaining 21.7MW are transferred to the public grid – sufficient to meet the needs of over 33,000 households in Macao. During 2022, the incineration centre supplied 16,166 units (10,000 kWh) of electricity to the public grid. In addition, in 2022 the Environmental Protection Bureau continued the third phase of the expansion of the Macao Incineration Centre, and completed the construction of the new special and hazardous waste treatment station.

Special and Hazardous Waste Treatment

The Macao Special and Hazardous Waste Treatment Centre commenced operation in 2007. It uses superheating techniques to treat waste materials that cannot be processed by the incineration centre, including discarded tyres, solid and liquid hazardous waste, carcasses of animals such as horses and dogs, slaughterhouse waste, medical waste, oil residue, and other special and hazardous wastes. In 2022, the waste treatment centre processed a total of 3,525 tonnes of waste (including medical waste), with discarded tyres comprising eight percent of the total.

Apart from the 23 fixed collection points and mobile recycling vehicles, the Electronic and Electrical Equipment Recycling Programme also offered free appointment-based pick-up services for large appliances from residents, schools, government departments, public corporations, public utilities, and non-profit organisations. By the end of 2022, about 447,000 items of used electronic and electrical equipment were collected.

Since the Environmental Protection Bureau introduced the Used Battery Collection Scheme, over 1,300 collection points have been set up in schools, merchants, shops, residential and commercial zones, public departments, and public refuse tips in various districts of Macao. By the end of 2022, over 179 tonnes of used batteries had been collected through the scheme, of which more than 100 tonnes of pre-treated disposable batteries and lead-acid batteries were transported to neighbouring regions for subsequent recycling and resource treatment in accordance with the Basel Convention.

By the end of 2022, over 880 collection points had been set up for used lamps, including fluorescent tubes and lamps, LED lamps, incandescent lamps, halogen lamps, high-intensity discharge (HID) lamps and other mercury-containing lamps under the “Disposing Used Lamps is Easy” event. The treated lamps will be exported to qualified treatment plants for recycling to harmless materials. More than 62,000 kilogrammes of used lamps were collected through the scheme by the end of 2022.

By the end of 2022, a total of 153 organisations had participated in the “Recycling Glass Bottles is Easy” scheme. Crushed glass from recycled bottles will be used as road construction material in Macao, and the remainder of the bottles will be exported to qualified treatment plants for recycling.

In addition, mobile recycling vehicles are parked at 16 different locations around Macao each month on a rotating basis, providing collection services for both large and small appliances, computers, communication equipment, used batteries, lamps, glass bottles and the “three-colour

resources” (paper, plastic and metal/aluminium cans).

Treatment of Construction Waste

Since the construction waste landfill commenced operations in 2006, it has been mainly used for the disposal of non-combustible inert solid waste produced through excavation, demolition, and construction. The solid waste includes debris, cement blocks, soft soil, marine clay and furnace slag. In 2022, about 2.42 million cubic metres of construction waste were disposed of.

In addition, the by-law on Macao’s Construction Waste Management System, enacted on 2020, regulates the use and charging system of construction waste landfill, and strengthens the mechanism for monitoring and punishment of illegal disposal of construction waste, encouraging waste producers to economically reduce construction waste at source.

Legislation and Pollution Control

Legislation enacted in 2022 covering environmental issues included:	
1	Plan for Granting Financial Support for Scrapping Obsolete Motorcycles and Their Replacement with New Electric Motorcycles (Order No. 5/2022 from the Secretary for Transport and Public Works);
2	Prohibiting Import and Transshipment of Certain Goods to the MSAR, Including Architectural Paints Exceeding the Volatile Organic Compound Content Limits (Executive Order No. 91/2022);
3	Amendment to Table 1 of Schedule of By-law No. 30/2016 - Tailpipe Emission Limits and Measurement of Exhaust Pollutants by in-use Vehicles, as amended by Order of the Chief Executive No. 130/2018, No. 80/2019 and No. 79/2021 (Executive Order No. 92/2022);
4	Tariff Scheme for Public Electricity Supply Services (By-law No. 25/2022);
5	Establishing the specific provisions on the parameters, tariff periods, tariff levels, tariff tiers, public charging tariffs, general charging tariffs and tariff assistance of the electricity supply tariffs under the Tariff Scheme for Public Electricity Supply Services (Executive Order No. 105/2022);
6	Amendments to Tables 1, 3, 4 and 5 of Schedule 2 of By-law No. 1/2008 - Regulations on Tailpipe Emissions of New Imported Vehicles, as amended by Executive Order No. 356/2010 and No. 257/2018 (Executive Order No. 111/2022);
7	Prohibiting the Import of Non-degradable Disposable Plastic Knives, Forks and Spoons to the MSAR (Executive Order No. 175/2022);
8	Plan for Granting Financial Support for the Scrapping of Old Diesel-Powered Vehicles (Order No. 26/2022 from the Secretary for Transport and Public Works); and

9	Extending the application period for the Plan for Granting Financial Support for the Scrapping of Obsolete Motorcycles and Their Replacement with New Electric Motorcycles to 31 March 2023 (Order No. 34/2022 from the Secretary for Transport and Public Works)
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International Treaties

New international agreements and treaties made applicable to Macao in 2022 included:	
1	Amendments to Schedule 2, Schedule 8 and Schedule 9 of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.

Environmental Protection and Energy Conservation Fund

The Government established the Environmental Protection and Energy Conservation Fund through By-law No. 21/2011, and on 26 July 2021, By-law No. 25/2021, amending Administrative Regulation No. 21/2011, was promulgated to improve the operation and management of the Environment and Energy Conservation Fund.

The Environment and Energy Conservation Fund established the Environmental Protection, Energy-saving Products and Equipment Subsidy Scheme, and the Subsidy Scheme for Elimination of Two-stroke Heavy and Light Motorcycles, with the completion of all approvals and disbursement of related subsidies. In addition, the Recycling Industry Equipment and Vehicles Subsidy Scheme was introduced by the Environment and Energy Conservation Fund in 2018, to subsidise purchases of equipment required for recycling industry operations. The application period closed on 25 November 2022. A total of 49 applications were received, of which 47 applications were handled and approved, involving subsidies of approximately 20 million patacas.

To further improve Macao air quality and achieve the Dual Carbon goals, in March 2022 the Environmental and Energy Conservation Fund launched the Plan for Granting Financial Support for the Scrapping of Obsolete Motorcycles and Their Replacement with New Electric Motorcycles, to encourage owners to replace their older, more polluting motorbikes with new electric motorbikes, thereby increasing the popularity of electric motorbikes. As at the end of 2022, 1,225 applications were received, of which 1,076 were approved, involving subsidies of about 3.7 million patacas. A total of 882 old motorbikes were collected.

In addition, to encourage owners to replace their older, more polluting diesel vehicles, the Environment and Energy Conservation Fund launched the Plan for Granting Financial Support for the Scrapping of Old Diesel-Powered Vehicles in September 2022, which was open for applications until 15 March 2023. As at the end of 2022, 136 applications were received, of which 114 were approved, involving subsidies of approximately 6.4 million patacas.

Promotion of Environmental Protection Education

With the theme “Building a Low Carbon Macao and Embracing a Green Life”, the Environmental Protection Bureau organised 371 diverse events during 2022, attended by 378,792 participants.

In January 2022, the Environmental Protection Bureau organised a briefing session on waste reduction for the convention and exhibition industry, to explain the key elements of the Restrictions on Using Plastic Bags law, and the by-laws on Macao Construction Waste Management System and Guidelines on Waste Reduction and Waste Classification for Meetings and Exhibitions. The bureau also established a platform to encourage merchant to donate the plastic bag charge to environmental and social welfare organisations.

To tie in with the implementation of the Plan for Granting Financial Support for the Scrapping of Obsolete Motorcycles and Their Replacement with New Electric Motorcycles and the Plan for Granting Financial Support for the Scrapping of Old Diesel-Powered Vehicles, the Environmental Protection Bureau joined hands with the relevant departments to conduct briefings for businesses, associations, vehicle owners and environmental organisations.

To support the executive order on Prohibiting the Import of Non-degradable Disposable Plastic Knives, Forks and Spoons to the MSAR, effective from 1 January 2023, the Environmental Protection Bureau held a briefing session for relevant trade associations and suppliers, in addition to the publicity regarding the law.

To provide a better understanding of the process for applying to import and export industrial chemicals and related goods under the Rotterdam Convention, along with related notes, the Environmental Protection Bureau organised a briefing session for the chemicals sector.

In compliance with the Kigali Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, and to promote the use of new refrigerants and related air-conditioning equipment, the Environmental Protection Bureau organised three workshops in collaboration with the Labour Affairs Bureau, to enhance the knowledge of relevant professionals.

In 2022, to continue expanding the recycling network in the community, the Environmental Protection Bureau set up the seventh Environmental Protection Fun corner at Mong Ha Public Housing, introducing the first smart food waste recycling machine and a 24-hour collection service for “three-colour resources” and glass bottles. The bureau also worked with organisations to set up Environmental Protection Fun collection points in three locations. By the end of 2022, there were 52 community collection points (including the Environmental Protection Fun collection points, Environmental Protection Fun corners, Environmental Protection Fun clean collection spots, and mobile recycling vehicles), to provide residents with more accessible recycling outlets. The Environmental Protection Fun corners constantly incorporate new elements, to further develop community recycling and environmental education functions through various environmental activities, serving as environmental education hubs for the community.

The Environmental Protection Fun corners welcome visits from schools, organisations and associations wishing to learn about clean recycling through hands-on activities. By the end of 2022, more than 140 visits were booked, with about 3,300 participants. In June 2022, the Environmental Protection Fun Station Pilot Project on Public Guided Tour was relaunched; this enables the public can practise clean recycling and reuse. By the end of 2022, four public guided tours were held,

with a total of 76 participants.

The Environmental Protection Bureau organised a series of environmental education events and the Green School Award Project through the Green School Project. In 2022, 50 schools participated in the Green School Awards Project, with 35 schools receiving awards, while 26 teams and 50 groups were awarded the Environment Education Pedagogical Project Awards and Green Campus Fun Awards, respectively.

The 15th Macao Green Hotel Awards 2021 were presented to 14 hotels. In all, there are now 57 award-winning hotels (as awards remain valid for three years).

The award-winning hotels have made significant achievements in formulating policies regarding emissions reduction, energy efficiency, transportation and general waste management, in addition to recycling and food waste management. Over the years, the total amount of waste collected by the award-winning hotels had exceeded 60,000 tonnes, including more than 18,000 tonnes of waste paper. To date, 70 percent of the award-winning hotels have collected food waste, totalling nearly 9,000 tonnes. In addition, some of the award-winning hotels have installed solar hot water systems and electricity generation facilities, with electric vehicle charging facilities also added and over 100 electric vehicle charging spaces fitted, representing a significant, 70 percent, increase from 2020.

The Environmental Protection Bureau continued the Scheme for Recognition of Eco-Supermarkets in collaboration with the Municipal Affairs Bureau, the Consumer Council, the Macao Merchandise Merchants Industry Chamber of Commerce and the Macao Union Suppliers Association, to promote the reduction of plastic wrapping, plastic bags, and energy saving and recycling in the supermarket sector. In 2021, a total of 55 out of 86 participating supermarkets received awards through the scheme.

Since the launch of the Environmental Protection Fun Bonus Points Scheme, the number of members exceeded 39,764 by the end of 2022. The Environmental Protection Fun – Waste Reduction and Recycling Scheme aims to encourage waste sorting and recycling among the public. Also, Environmental Protection Fun – Moving Towards Being Environmentally-friendly encourages people to assist with providing guided tour services in a nature reserve.

To provide a more accessible recycling channel, the Environmental Protection Bureau installed smart recycling machines that can recycle plastic bottles and metal drink cans. By the end of 2022, more than 610,000 plastic bottles and 120,000 metal cans were collected.

The “Recycling in Buildings is Easy” programme promotes the installation of three-coloured bins and glass bottle recycling bins in buildings and arrange for regular collections of recyclables. By the end of 2022, over 800 buildings participated in the programme.

The “Recycling Used Clothes is Very Easy” programme introduced a new collection service at Environmental Protection Fun corners, with used clothes collection bins open 24 hours per day in Environmental Protection Fun corners of Iao Hon Tranquilidade, S. Lourenço and Mong Ha. The bureau also partnered with non-profit organisations to sort the collected used clothes. In addition, the street bins were centrally managed by the Environmental Protection Bureau. By the end of 2022, a total of 694 tonnes of clothes were collected.

The “Cherishing Food is Easy” programme encourages the catering industry to develop “food-

friendly restaurants” through management, staff training and cooperation, and promotions to customers, in order to jointly become food-wise and reduce food waste. As at the end of 2022, the programme had attracted participation by over 200 restaurants.

The “Reducing Plastic is Easy” scheme encourages the public to reduce the use of disposable utensils. As at the end of 2022, the scheme had recorded over 1.9 million customer requests for “plastic reduction” and saved an estimated 4.2 million sets of disposable utensils.

The “Bringing Your Own Water Bottles is Easy” campaign promotes the habit of carrying reusable water bottles. By the end of 2022, 75 drinking water dispensers had been installed across Macao, saving more than 2.53 million plastic bottles.

The Environmental Protection Bureau has been promoting the Food Waste Reduction in Macao Food Festival Scheme for 13 consecutive years, to highlight environmental messages, including on reducing the use of disposable utensils, waste sorting and recycling, food waste recycling and food saving, and to facilitate waste reduction at source through setting up promotion booths, along with waste sorting and recycling bins, and recycling food waste from food stalls. In addition, nearly 30 students and teachers from “green schools” took part in the Enjoying Food Festivals with DSPA Mascot event.

Also, the bureau promoted environmental messages to the public during environmental festivals such as World Environment Day, and encouraged the public to participate in environmental activities and put environmental protection into practice.

The Government has supported the Earth Hour campaign launched by World Wide Fund for Nature (WWF) for 14 consecutive years. Under the coordination of the Environmental Protection Bureau, the campaign mobilised government departments, corporations, banks and hotels to turn off unnecessary lights for one hour, from 8:30pm to 9:30pm, on 26 March 2022.

In response to World Environment Day on 5 June 2022, the Environmental Protection Bureau launched the World Environment Day 2022 Activity Series jointly with the environmental protection departments of the Guangdong-Hong Kong-Macao Greater Bay Area, and the public authorities, associations, entertainment complexes and institutions of Macao. Activities included “Lights-off for 1 Hour” campaign, “Casual Clothing in Summer for Energy Conservation”, “5% Energy Saving” lucky draw, and Festival of the World Environment Day of the Greater Bay Area, to promote energy saving, emissions reduction, waste reduction and other environmental protection messages.

Regional Cooperation on Environmental Protection

In terms of international environmental cooperation, the Environmental Protection Bureau participated in the Fourth Meeting of the Conference of the Parties to the Minamata Convention on Mercury with the national delegation through video conference; and attended the Technical Coordination Meeting of the Stockholm Convention on Persistent Organic Pollutants (POPs) 2022 by video conferencing.

The Macau International Environmental Co-operation Forum and Exhibition 2022 (MIECF 2022) was organised by the MSAR Government from 9 December to 11 December 2022, with the National Development and Reform Commission, the Ministry of Science and Technology, the

Ministry of Industry and Information Technology, and the Ministry of Ecology and Environment as special sponsors; the Pan-Pearl River Delta provincial/regional governments as co-organisers; and the Macao Trade and Investment Promotion Institute, and the Environmental Protection Bureau as official contractors. The event theme was “Commitment to Green Development, Moving Towards the Dual Carbon Goals”.

MIECF invited nearly 40 experts, academics, industry leaders and corporate executives from mainland China, Hong Kong and Macao to share their insights on topics such as carbon neutrality, green mobility, the 14th Five-Year Plan, energy transformation and green finance. The event was divided into online and offline exhibition halls, and featured the Green Mobility Zone as the first of its kind to offer test drive activities for enhancing public knowledge of electric vehicles, while the Green Public Day offered free public access to the Green Showcase.

Regarding environmental cooperation in the Pan-Pearl River Delta Region, the Environmental Protection Bureau attended the 18th Coordinator Working Meeting of the Joint Conference on Pan-Pearl River Delta Regional Environmental Protection Cooperation and the 18th meeting of the Joint Conference on Pan-Pearl River Delta Regional Environmental Protection Cooperation through video conferencing in July and August 2022, respectively.

In July 2022, Guangdong, Hong Kong and Macao jointly announced the 2021 Report of the Guangdong-Hong Kong-Macao Pearl River Delta Regional Air Quality Monitoring Network. In addition, the bureau attended the seventh Guangdong-Hong Kong-Macao Wetland Ecological Conservation Symposium through video conferencing in November 2022.

Under the Guangdong-Macao Environmental Protection Cooperation Agreement, the two parties convened the Guangdong-Macao Environmental Cooperation Working Group Video Meeting in January 2022, to exchange views on regional air monitoring, water environment management, recycling scrapped vehicles and waste paper, environmental industries, publicity and education.

Regarding Hong Kong-Macao environmental cooperation, in September 2022 bureau officials convened the 14th Meeting on Environmental Protection Cooperation between Hong Kong and Macao through video conferencing. The parties exchanged views on environmental conditions, air pollution, electric vehicles, waste reduction, solid waste treatment, climate change and environmental exhibitions and seminars, and discussed plans for future cooperation. The Environmental Protection Bureau also attended Eco Asia Video Conference 2022 of Eco Expo Asia through video conferencing.

Under the framework of the Zhuhai-Macao Environmental Protection Cooperation Agreement, the Zhuhai-Macao Environmental Cooperation Working Group Meeting 2022 was held in September 2022. The two parties reviewed the environmental cooperation projects in the past year, and exchanged views on marine pollution governance, atmospheric environment quality and monitoring, communication on environmental emergencies, exchanges on ecological issues, environmental protection industry and promotion of environmental protection education. There were also discussions on plans for cooperation in the coming year.

Environmental Protection Planning in Macao

In January 2022, the Environmental Protection Bureau announced the Implementation of the Environmental Protection Plan of Macao (2010-2020) and Performance Assessment, to conclude the first environmental protection plan of Macao in practice and its performance. Also, the Environmental Protection Plan of Macao (2021-2025) for the environmental work in the next five years was announced, aiming to achieve the vision of “Building a Low Carbon Macao, Creating Green Living Together”.

Environmental Data

In June 2022, the Environmental Protection Bureau published the Report on the State of the Environment of Macao 2021, which introduced various aspects of Macao’s environment and trends reflecting ways they are changing, as well as the effectiveness of responses to environmental issues, in order to promote awareness of and participation in environmental protection among all sectors of the community.

Complaints received by the Environmental Protection Bureau in 2022:

Category	Number of cases
Noise	1,971
Air pollution	597
Noise and air	106
Noise and other	88
Air and other	52
Environmental hygiene	89
Other	168
Total	3,071

Technical advice provided at the request of other departments in 2022:

Department	Premises and projects	Nos.
Tourist Office	Premises including karaoke bars, bars, hotels, restaurants, sauna and massage establishments, dance halls and health clubs.	273
	Inspections before issuance or renewal of licences	128

(Cont.)

Department	Premises and projects	Nos.
	Technical advice	2
Economic and Technological Development Bureau	Technical advice	37
	Inspection of industrial sites	22
	Technical advice on import applications for HCFCs as “Controlled Substances” under Decree-Law No. 62/95/M	59
Lands, Public Works and Transport Bureau	Project plans including piling foundation (environmental protection) projects and applications for extension of construction time, construction plans, expansion plans, modification of / legalisation on construction projects	236
	Maps of urban conditions	81
	Draft by-law	2
	Technical advice	82
Municipal Affairs Bureau	Technical advice on licensed premises	210
	Site inspections	177
	Project plans	1
	Technical advice	45
Infrastructure Development Office	Project plans	59
	Technical advice	340
Other departments	Technical advice	43

Moreover, the Environmental Protection Bureau provided 286 technical recommendations on environmental planning assessment areas, and received 13 environmental impact assessment reports on new projects and related information in 2022.

Flora

Macao abounds in plant species. More than 1,500 species of vascular plants have been identified in Macao. These are mainly found in woodlands, parks and leisure grounds. Most of Macao’s vegetation

belongs to the evergreen broad-leaf woodland, tree, shrub and coastal bush groups, including such species as Rose Myrtle (*Rhodomyrtus tomentosa*), Blood-red Melastoma (*Melastoma sanguineum*), Oblong leaved Litsea (*Litsea rotundifolia* var. *oblongifolia*), Pop-gun Seed (*Bridelia tomentosa*), Hong Kong Hawthorn (*Rhaphiolepis indica*) and Linear Forked Fern (*Dicranopteris*). The most common species of cultivated plants are the Chinese Hibiscus (*Hibiscus rosa-sinensis*), Hong Kong Orchid Tree (*Bauhinia blakeana*), Sunshine Tree (*Cassia surattensis*) and False Groundnut (*Desmodium heterocarpon*).

Also, Macao has 104 species of bryophytes which belong to 34 genera and 63 families. Rare species include *Fissidens macaoensis*, *Kurzia sinensis*, *Phaeoceroa laevis*, *Notothylas japonica* horik, *Micromitrium* and *Vesicularia*. *Fissidens macaoensis* is a new species to science which was officially announced in 2011. As it was discovered in Macao, its Latin name includes “Macao”.

The terrestrial vegetation in Macao has a relatively diverse plant community. Types of vegetation can be identified: coniferous forests, mixed conifer-broadleaf forests, evergreen broadleaf forests, mixed evergreen-deciduous plants and scrublands. Forest areas on Taipa and Coloane have undergone a compositional transformation. A firebreak was set up, and many indigenous tree species were introduced, including Melia-leaved Evodia (*Tetradium glabrifolium*), Hong Kong Gordonia (*Gordonia axillaris*), Acronychia (*Acronychia pedunculata*), Morris’s Persimmon (*Diospyros morrisiana*), India Carallia (*Carallia brachiata*), Yanmin (*Dracontomelon duperreanum*), Persimmon-leaved Litsea (*Litsea monopetala*), *Michelia chapensis*, Burmese Rosewood (*Pterocarpus indicus*), Heterophyllous Winged-seed Tree (*Pterospermum heterophyllum*), Silver-back Artocarpus (*Artocarpus hypargyreus*), *Pinus elliottii* × *Pinus oaribaea*, Common Fig (*Ficus carica*), Horse-tail Pine (*Casuarina equisetifolia*), Chinese Holly (*Ilex rotunda*), *Michelia macclurei* and Chinese Guger Tree (*Schima superba*).

In addition to leafy plants that were commonly used in the past – namely the Dwarf Yellow (*Duranta repens*), Golden Leaves (*Ficus microcarpa*), Bridal Wreath (*Stephanotis floribunda*), Fukien Tea (*Ehretia monopyrena*), Cochin-china Excoecaria (*Excoecaria cochinchinensis*) and Ivy Tree (*Schefflera heptaphylla*) – colours were added to the green belts to improve greening of streets in Macao and create a better view by growing colourful flowering shrubs, such as Ti Plant (*Cordyline fruticosa*), Britton’s Wild Petunia (*Ruellia brittoniana* Leonard), Hawaiian Hibiscus (*Hibiscus rosa-sinensis*), Yellow Allamanda (*Allamanda cathartica*), Purple Allamanda (*Allamanda blanchetii*), Indian Canna (*Canna indica*), Dwarf Umbrella Tree (*Schefflera arboricola* ‘*Variegata*’) and Red Strap Flower (*Loropetalum chinense* f. *rubrum*) in recent years. The view looks more layered with the addition of these flowers, together with trees such as Terminalia (*Terminalia mantaly* H. Perrier), Chinese Holly (*Ilex rotunda*), Chittagong Chickcrassy (*Chukrasia tabularis*) and Lance-leaved Sterculia (*Sterculia lanceolata*).

Woodland Recovery

Macao was hit by strong typhoons Hato and Mangkhut in 2017 and 2018 respectively, which caused severe damage to forest ecosystems.

In the fourth quarter of 2018, with support from the Chinese Academy of Forestry of Guangdong

Province, which is directly under the Forestry Administration of Guangdong Province, the Municipal Affairs Bureau commenced the first stage of woodland recovery.

The recovery work was completed in two phases. In the first phase of the woodland recovery, guided by the Forestry Administration of Guangdong Province, with the assistance of Chinese Academy of Forestry of Guangdong Province, a total of 35,000 saplings were replanted or transplanted. Damaged woodland within five metres of 11 trails was restored, covering a total area of 35 hectares. The recovery work was completed in September 2019, with a remarkable result of over 98 percent survival rate of the saplings, which bloomed and grew fruits in spring and summer 2020.

The second phase of woodland recovery commenced in the fourth quarter of 2019, as planned by the Municipal Affairs Bureau, covering an area of about five hectares. In all, 5,000 saplings were replanted or transplanted.

After completion of the first stage of emergency ecological recovery, the second stage – woodland ecology recovery – commenced in the fourth quarter of 2021, focusing on overall improvement and enhancement. It is expected this will be completed in about five to ten years, with the goal of restoring an area of at least 120 hectares by 2024. With the assistance of the Guangdong Forestry Science Academe, the third phase of woodland recovery commenced in September 2021 and completed in August 2022 according to the forestry design plan, and included the thinning and removal of dead trees, covering an area of about 15 hectares. In all, approximately 15,000 saplings were replanted or transplanted.

The fourth phase of woodland recovery commenced in August 2022, with a recovery area of 35 hectares and approximately 34,000 saplings to be planted; the fifth phase of woodland recovery commenced in November 2022, to recover an area of approximately 35 hectares and plant about 34,000 saplings. Both recovery projects are expected to be completed by the second quarter of 2023.

Fauna

Macao is small. The development of land and expansion of urbanisation affect and damage the survival and scope of activities of wild animals. The numbers of species and populations of wild animals in Macao are decreasing.

The scarcity of unpolluted waters in Macao leads to a decrease in the diversity and numbers of amphibians. The commonest species are Asian Common Toad (*Bufo melanostictus*) and Ornate Pygmy Frog (*Microhyla ornata*). In the hilly forest area of Coloane, the Municipal Affairs Bureau has constructed artificial freshwater wetlands as better habitats for amphibians.

The commonest wild mammals are bats, rats and Red-bellied Tree Squirrels. Bats mainly inhabit Coloane and Taipa. The Japanese House Bat (*Pipistrellus abramus*) and Short-nosed Indian Fruit Bat (*Cynopterus sphinx*) can be found on the Macao peninsula. The former frequents gaps between buildings and lives on mosquitoes and flies, helping to limit populations of harmful insects. The latter eat fruits in parks or woods, and may help spread their seeds, contributing to the city environment and natural environment of the woods. The Red-bellied Tree Squirrel is an exotic species, formerly imported as a pet. It is now wild in Macao. Its lack of natural enemies poses a threat to other animal species, especially birds, as the squirrels eat their eggs.

Reptiles, especially snakes, play an important ecological role in controlling the number of rats. The common Chinese Rat Snake (*Ptyas korros*), Oriental Rat Snake (*Ptyas mucosa*) and Asiatic Water Snake (*Fowlea piscator*) are non-venomous, while common venomous species include White-lipped Pit Viper (*Trimeresurus albolabris*) and Taiwan Cobra (*Naja atra*). Two rare species, Many-banded Krait (*Bungarus multicinctus*) and Burmese Python (*Python bivittatus*), were recorded several times in 2019. However, Macao's dense population poses an enormous threat to their dwelling and foraging areas. In addition, some people's misunderstanding and fear about snakebites have caused the number of snakes to decrease most significantly among all wild animals in Macao.

Previous studies recorded over 300 species of birds in Macao. A total of over 290 species of birds has been recorded from 2006 to the present. In 2022, 166 species of birds were recorded in Macao.

There are abundant fish stocks in Macao, which can be categorised into saltwater fish, brackish fish and freshwater fish. Saltwater fish and brackish water fish mainly refer to the fish off the coast of Macao. There are approximately 200 species of these fish. Freshwater fish most need protection in the natural environment. Although the habitats of freshwater fish and amphibians are similar to each other, the former have a narrower sphere of activities. Whenever the environment is destroyed or altered by human activities, they are often affected most directly.

There are over 700 species of insects, which are widely distributed in Macao, including 150 ant species, over 100 butterfly species and more than 40 dragonfly species.

Laws Governing Nature Conservation

Macao began to enact laws and regulations on nature conservation – including the establishment of nature reserves and the protection of flora and fauna of special interest – more than 40 years ago. New by-laws were promulgated in 2004 to replace older ones. They are as follows:

1. Decree-Law No. 33/81/M, gazetted on 19 September 1981; Decree-Law No. 30/84/M, amended on 28 April 1984; and Decree-Law No. 3/99/M, revised on 25 January 1999, which designated a 196,225-square-metre area of Seac Pai Van Country Park as a conservation area of outstanding educational, ecological, scenic and scientific value;
2. Law No. 11/2013, approved by the Legislative Assembly on 13 August 2013, and By-law No. 31/2018 enacted on 4 May 2018, designated part of Coloane island with an altitude of 80 metres or above as a buffer zone. Under the same law, Executive Order No. 168/2021 – List of Protected Old and Valuable Trees, promulgated on 8 November 2021, provides effective protection for the listed trees.
3. The Environmental Law, approved by the Legislative Assembly on 31 January 1991 and gazetted by Law No. 2/91/M on 11 March 1991, which set out general guidelines and basic principles for the formulation of environmental policies;
4. General Regulations Governing Public Places (By-law No. 28/2004) enacted on 28 July 2004, which established general principles for behaviour to be observed when using and enjoying public places; and
5. By-law No. 15/2022, amending Sanitary and Phytosanitary Control (By-law No. 40/2004)

enacted on 14 December 2004, came into effect on 16 April 2022, and implemented Chief Executive Order No. 245/2014 on the List of Regulated Quarantine Plant Pests of the Macao SAR.

6. The Animal Protection Law (Law No. 4/2016) came into effect on 1 September 2016, with regulations on keeping, managing and selling animals, and the use of animals in public exhibitions and scientific applications. In addition, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Convention on Biological Diversity, and the International Plant Protection Convention have been made applicable to Macao, thus ensuring that Macao's nature conservation policies conform to international practices.
7. To ensure the enforcement of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in Macao, the Legislative Assembly of the Macao SAR deliberated and passed Law No. 2/2017 regarding the convention.

Nature Reserve

The Taipa-Coloane Wetland Reserve managed by the Environmental Protection Bureau is situated adjacent to the Lotus Flower Bridge in Taipa and Coloane. It has a total area of 55 hectares, including a 40-hectare bird foraging area that is regarded as zone two of the reserve, on the west coast of reclaimed area between Taipa and Coloane. Next to this zone is a 15-hectare bird habitat, regarded as zone one of the reserve, which provides different bird species (including the rare Black-faced Spoonbill) with suitable habitats.

As at the end of 2022, the Cotai Nature Reserve's known plant species included 280 species of planktonic algae, four species of bryophyte, 21 species of pterophyte, 11 species of gymnosperm, and 366 species of flowering plants. Regarding animal species, 143 plankton species, 133 zoobenthos species, 546 species of insects, 103 species of fish, five species of amphibians, 21 species of reptiles and 11 species of mammals were recorded. The abundant food resources have attracted 190 species of birds to forage and roost in the nature reserve, including the globally rare Black-faced Spoonbill (*Platalea minor*).

A series of events in the Cotai Nature Reserves were held monthly by the Environmental Protection Bureau, including the Cotai Nature Reserve Open Day, the "Nature School" family workshop, and bird watching in nature reserves during migratory bird seasons from November to April the following year, while Ichthyology Workshops were held in other seasons to raise public awareness of environment protection.

Country Parks

There are four country parks in Macao: Seac Pai Van Country Park, Taipa Grande Nature Park, Hac Sa Reservoir Country Park, and Ka Ho Reservoir Country Park.

Seac Pai Van Country Park

Situated to the west of Coloane, Seac Pai Van Country Park is bounded by quarries to the north,

Seac Pai Van Road to the west, Estrada do Alto de Coloane to the south, and Estrada do Militar to the east, covering an area of approximately 198,000 square metres. The park was established by legislation as a reserved zone in 1981 for its educational, ecological, scenic and scientific values, pioneering nature education in Macao. In 1984, it became the first country park in Macao.

Giant Panda Pavilion

Set against a hill side in Seac Pai Van Park of Coloane, with a fan-shaped layout and an area of about 3,000 square metres, Macao Giant Panda Pavilion is designed to combine the terrain's natural undulations with the architectural characteristics. The pavilion comprises two 330-square metre indoor activity quarters and a 600-square metre outdoor yard. The appearance of the Macao Giant Panda Pavilion is designed to mimic nature, and it features green elements with leisure facilities such as pools and wooden climbing frames for the pandas.

Taipa Grande Nature Park

Taipa Grande Nature Park is on the east of Taipa island, and covers a wooded and hilly area between Ponta da Cabrita Road, Governador Nobre de Carvalho Avenue and Padre Esteveo Eusebio Situ Road. The park is famous for its sunrise and sunset views, along with views of herons, and planes landing and take-offs. It has an observation deck, a viewing pavilion, a children's playground, a barbecue area, a circular plaza, a green promenade, a grass skiing slope, and Taipa Grande Trail, while serving as a multifunctional park for relaxation, exercise, environmental protection, education, and retreat. It is also an ideal destination for Macao residents to enjoy forest scenery to the full, embrace nature and enrich their leisure time. The total area is approximately 559,000 square metres.

Hac Sa Reservoir Country Park

Hac Sa Reservoir Country Park is situated in a hilly forest area on the south-eastern slopes of the central mountain of Coloane. The park occupies 377,000 square metres between the entrance of the Westin Resort Macau on Hac Sa Road to the east, and Chu Ku Tong pond, in front of Man Hong Un, to the south. The park is named after Hac Sa Reservoir due to this being its most distinctive geographical feature.

Ka Ho Reservoir Country Park

Ka Ho Reservoir Country Park is situated on the northeast of Coloane island. The park faces Ka Ho Village to the east, separated by Barragem de Ka Ho Road. Seac Pai Van Reservoir lies to its west; and the golf course and Alto de Coloane Road lie to its south. It is bordered by a road that leads to the youth challenge centre in the north; and it stretches all the way down to a wooded and hilly area by the shoreline. Ka Ho Reservoir Country Park has an area of approximately 507,000 square metres.

With Ka Ho Reservoir as its central point, the park boasts various facilities, including the Ka Ho Reservoir Trail, Northeast Trail, Dam Mural, Waiting Square, and Little Spring; as well as barbecue, and picnic areas; the Blossom Bridge; diversity games zone; Ka Ho Reservoir Outdoor Experimental Camp; and the Freshwater-Wetland Ecological Zone. With its educational and recreational features, Ka Ho Reservoir Country Park is an ideal place to spend leisure time.

As work proceeded on expansion of Ka Ho Reservoir, Ka Ho Reservoir Country Park, which is managed by the Municipal Affairs Bureau, was closed to the public until the completion of the project.

Population

Macao's resident population was 672,800 at the end of 2022, representing a decrease of 10,400, or 1.5 percent, over the previous year. An estimated 46.8 percent of Macao's population were males, and 53.2 percent were females.

The local population was 570,700 at the end of the year, representing an increase of 600, or 0.1 percent, over the previous year. The number of foreign employees residing in Macao declined by 15.5 percent to 79,000, while the number of foreign students residing in Macao increased by 17.9 percent to 23,100.

Natural factors are among the reasons for the increase in population. In 2022, there were 4,344 new-born babies, 13.6 percent fewer than in 2021, and 3,004 deaths, 29.5 percent more than in 2021. The natural population growth rate saw an ongoing decline, with a drop of 0.2 percent, the lowest on record since 1985.

On top of this increase, there was a change in immigration, another factor influencing population. The net number of immigrants was minus 11,700 in 2022, largely attributed to fewer foreign employees residing in Macao.

Regarding the population distribution by statistical district, most residents lived in Baixa da Taipa, with 73,900 residents, comprising 11.0 percent of the total population, followed by Areia Preta New Reclamation Zone (10.3 percent) and Areia Preta and Iao Hon Districts (10.0 percent). Universidade e Baía de Pac On, and New Outer Harbour Reclamation Area (NAPE) Districts saw increases of 1,800 and 800 residents, respectively, from 2021, while Praia do Manduco and Baixa da Taipa Districts saw decreases in population from 2021, by 2,600 and 2,000 residents, respectively.

Birth and Death Rates

In 2022, the birth rate was 0.64 percent, representing a drop of 0.1 percentage points, while the death rate was 0.44 percent, 0.1 percentage points lower than the previous year.

Population Ageing

Macao's population is ageing because of the increasing life expectancy. Senior citizens (aged 65 years or above) made up 13.3 percent of the population, 1.1 percentage points more than the

previous year; the number of other adults (aged 15-64 years) dropped by 0.7 percentage points, representing 72.6 percent of the population. The ageing index increased by 10.7 percentage points to 94.4 percent of the population over the previous year, marking the 26th consecutive year this index has increased, and indicating the elderly population is approaching parity with the number of children and teenagers.

The ageing in the population of Macao people is more significant, with 15.7 percent represented by senior citizens (aged 65 years or above), and 67.7 percent by other adults (aged 15 years to 64 years). The elderly dependency ratio of the population of Macao people was 23.1 percent, which means there was one senior citizen for every four adults.

Identification Bureau

Under the Basic Law of the Macao SAR, the Macao Special Administrative Region Government is authorised by the central government to issue MSAR Passports to Chinese citizens who hold MSAR Permanent Resident ID cards, and to issue other types of MSAR travel permits to other legal residents of Macao. MSAR Passports and travel permits are valid for worldwide travel, and entitle their holders to return to Macao.

The Identification Bureau is under the administration of the Secretariat for Administration and Justice, and is responsible for the overall planning and work relating to the civil and criminal identification of Macao residents. It issues ID cards and certificates of criminal record, certificates to substantiate the facts stated in official record, MSAR Passports, and other travel permits to Macao residents. It also responsible for handling nationality applications from MSAR residents, receiving and handling applications for Certificate of Entitlement to Right of Abode and issuing the related certificates, arranging the registration of associations and syndicates qualified as juridical persons and issuing the related certificates, as well as other duties as vested by law.

Personal Identity Cards

Only Chinese citizens who are permanent residents in Macao with a Macao Resident ID card are eligible to apply for an MSAR Passport. A Chinese citizen who is a Macao Resident ID cardholder, but not a permanent resident of Macao and not eligible for other travel permits, may apply for an MSAR travel permit.

By 31 December 2022, the Identification Bureau had issued 806,722 MSAR Passports and 57,337 travel permits.

Under the Nationality Law of the People's Republic of China and the Interpretation by the Standing Committee of the National People's Congress on Several Questions Relating to the Application of the Nationality Law of the People's Republic of China in the Macao Special Administrative Region, any permanent resident of Macao with Chinese nationality and a Portuguese travel document may travel to other countries or regions with the Portuguese travel document as before. Therefore, such people may hold both a Macao SAR Passport and a Portuguese travel document at the same time.

The Identification Bureau is responsible for issuing Visit Permits for Residents of the Macao SAR to the Hong Kong SAR (also known as “Visit Permits to the HKSAR”). Residents of the MSAR who are either Chinese or Portuguese citizens and who hold a Macao Resident ID card or an MSAR Resident ID card may apply for Visit Permits to the HKSAR. The bureau had issued 450,771 such permits as at 31 December 2022.

The Identification Bureau is also responsible for issuing Macao SAR Resident ID cards. As at 31 December 2022, there were 743,388 Macao SAR Resident ID card cardholders. Between 1 January 2022 and 31 December 2022, 7,382 residents received Macao SAR Resident ID cards for the first time.

Nationality

Under Law No. 7/1999, the Identification Bureau is responsible for handling nationality applications from MSAR residents, including applications by foreign nationals or stateless persons for naturalisation; applications by Chinese citizens to renounce Chinese nationality; applications by foreigners who previously had Chinese nationality to restore Chinese nationality; applications by MSAR residents of both Chinese and Portuguese descent to choose either Chinese or Portuguese nationality; and applications by original Macao residents who are Chinese citizens with other nationalities to adopt Chinese nationality.

Between 20 December 1999 and 31 December 2022, 1,380 applications for naturalisation were approved; 576 people restored their Chinese nationality; 107 renounced their Chinese nationality; 3,616 successfully applied to adopt Chinese nationality; 73 opted for Portuguese nationality; and there were seven applications for change of nationality.

Certificate of Entitlement to Right of Abode

A certificate of entitlement to right of abode confirms the status of a permanent resident of the MSAR. Any person who claims to have right of abode in the MSAR but does not hold a valid Macao Resident ID card or MSAR Resident ID card and who does not live in any other region of the People’s Republic of China (except the Hong Kong SAR and Taiwan) must apply for a certificate of entitlement to right of abode.

Such people include Chinese citizens who have ordinarily resided in Macao for seven consecutive years before or after the establishment of the Macao SAR; children of Chinese nationality born outside Macao whose parents are Chinese nationals and permanent residents of Macao; people of both Chinese and Portuguese descent who have ordinarily resided in Macao for seven consecutive years before or after the establishment of the MSAR; and children of Chinese nationality or children born outside Macao who have not selected a nationality but intend to reside in Macao permanently and whose parents are permanent Macao residents of either Chinese citizenship or Portuguese descent. The certificate of entitlement to right of abode indicates its date of effectiveness, prior to which holders of the certificate have no right to enter or reside in Macao.

Between 20 December 1999 and 31 December 2022, the Identification Bureau issued 83,778 certificates of entitlement to right of abode.

Certificate of Criminal Record

In August 1996, the Identification Bureau started to issue certificates of criminal record and certificates of special record for minors.

The former is the sole and sufficient document to prove whether an applicant has any criminal record; while the latter is applicable to those under 16.

Between 1 January and 31 December 2022, the bureau issued a total of 73,174 certificates of criminal record. Of these, 59,148 were in response to public applications, and 14,026 were for agency applications. Among the 51 certificates of special record for minors that were issued, nine were to public bodies, and 42 were to minors applying through an agency.

Immigration Controls

According to the Basic Law of the Macao SAR, the Government may impose restrictions on people from other countries or regions entering, staying in, and leaving Macao. The Immigration Department of the Public Security Police is responsible for entry and exit in Macao.

The MSAR Immigrant Department records the entry and exit of non-residents, as well as their passport, visa, or other relevant documents for reference; and collect biometrics for identification when necessary.

By 31 December 2022, citizens of 81 countries enjoyed visa-free access to Macao. Valid passport holders of these countries and regions may enter and stay in Macao for 14 to 90 days, while those from certain countries may stay for up to six months. PRC passport or travel permit holders who have a valid air ticket and visa issued by the country or region of destination may stay for a maximum of seven days in Macao.

Legal Immigration

In 2022, the number of new immigrants from mainland China holding one-way permits decreased by 452 from the previous year, to 2,175, with the number of new immigrants from Guangdong province decreasing by 203 to 1,502, 66.11 percent of whom were female and 33.89 percent were male. Among new immigrants, 30.62 percent were aged below 30 years, representing a drop of 1.32 percentage points.

Overstaying and Illegal Entry

In 2022, 9,556 overstayers were repatriated. They included 9,181 mainland China residents, 55 Taiwan (China) residents, 54 Hong Kong residents, 266 foreign nationals, and 7,701 voluntarily repatriated mainland Chinese.

Civil Registration

The Civil Registry is responsible for implementing regulations relating to the civil registration of

births, parentage, adoption and child custody, marriage agreements, deaths, legal certification of the deaths of missing persons, and issuing relevant certified documents.

Birth Registration

The Birth Registry is responsible for the registration of births in Macao, as well as the re-registration of births of people aged 14 or over. The Civil Registry should be verbally notified of any birth in Macao by the parents or guardians within 30 days. There were 4,375 registered births during 2022.

Marriage Registration

The Civil Registry is responsible for handling applications for marriages, approving marriage registrations, hosting ceremonies for the signing of marriage certificates and registering marriages. A total of 2,727 marriages were registered during 2022.

Death Registration

Family dependents or other relatives of a deceased person may register his or her death with the Civil Registry. There were 2,576 deaths registered during 2022.

Divorce by Mutual Consent

The Civil Registry has the authority to process divorce by mutual consent. Applicants who have been married for over one year, have no children aged under 18, and have reached agreement on maintenance payments and ownership of their residences may submit applications to the Civil Registry. There were 514 divorce applications during 2022.



Hac Sá Green and Leisure Area





The Hac Sá Temporary Green and Leisure Area, in Hac Sa Beach Park, features an off-roading track, a wooden playground, an area with ornamental plants, and an avenue lined with trees, and is ideal for family picnics on the grass, bathed in sunshine and beneath a blue sky. The facilities in the wooden playground retain the organic form of wood, and are made from recycled timber. The photogenic ornamental plant area comprises several zones, including with bamboo, miscanthus, celandine and marsh plants. Strolling through the area, visitors can experience its green vibes.