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GEOGRAPHY, ENVIRONMENT AND POPULATION



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 2023. 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

According to Executive Order No. 2/2024 dated 8 January 2024, the Macao Special Administrative Region Coastline Map was published to determine the coastline of the Macao SAR, with 1 January 2023 as the baseline date for the revision and survey of the coastline. The total length of Macao's coastline is 79.5 kilometres, 18.5 kilometres of which are around the Macao peninsula; 49.5 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 Checkpoint Artificial Island of the Hong Kong-Zhuhai-Macao Bridge; and 3.1 kilometres are around New Urban Zone Area C.

There are two types of coastline in the Macao SAR: artificial and natural coastlines. Artificial coastlines predominate, representing 84.3 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 15.7 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 November, with July to September as its peak period.

Weather Overview

General Information

In 2023, Macao's average annual temperature and relative humidity were both higher than the climate normal, while the total rainfall was higher than the climate normal, but within the normal range.

Five tropical cyclones affected Macao in 2023. They were Typhoon Talim from 14 July to 18 July, Super Typhoon Doksuri from 26 July to 28 July, Super Typhoon Saola from 30 August to 3 September, Severe Typhoon Haikui on 4 September and 5 September, and Typhoon Koinu from 5 October to 9 October.

Regarding storm surge warnings, as a result of Typhoon Talim, Typhoon Saola and Typhoon Koinu, one Red Storm Surge Warning, Two Orange Storm Surge Warnings, one Yellow Storm Surge Warning and three Blue Storm Surge Warnings were issued in 2023, during which Typhoon Talim caused the most severe flooding, with the maximum flood height of 0.33 metres recorded during the morning of 17 July in the south of the Inner Harbour.

A total of 38 rainstorm warnings were issued in Macao in 2023, including the Red Rainstorm Warning Signal in the morning of 1 June, at night on 14 June, from midnight on 7 September into the late morning of 8 September and at night on 15 September. The total effective period of the rainstorm warning on 7 September and 8 September was 11 hours and 50 minutes, which was the second-longest duration of a rainstorm warning since the new three-level rainstorm warning system was adopted on 1 September 2020.

Summary of Severe Weather Warnings Issued in 2023

Warning / Signal Type		Frequency	No. of Warning Reports Issued
Tropical Cyclone Warning	No. 1 Alert Signal	5	35
	No. 3 Strong Wind Signal	6	34
	No. 8 Northeast Gale Signal	2	23
	No. 8 Southeast Gale Signal	2	18
	No. 8 Southwest Gale Signal	0	0
	No. 8 Northwest Gale Signal	1	9
	No. 9 Increasing Gale Signal	1	2
	No. 10 Typhoon Signal	1	5

(Cont.)

Summary of Severe Weather Warnings Issued in 2023

Warning / Signal Type		Frequency	No. of Warning Reports Issued
Strong Monsoon Warning (Black Ball)		15	53
Rainstorm Warnings	Yellow Rainstorm Warning Signal	38	84
	Red Rainstorm Warning Signal	5	13
	Black Rainstorm Warning Signal	0	0
Thunderstorm Warning		87	219
Storm Surge Alert		0	0
Storm Surge Warning	Blue Storm Surge Warning	3	9
	Yellow Storm Surge Warning	1	2
	Orange Storm Surge Warning	2	5
	Red Storm Surge Warning	1	3
	Black Storm Surge Warning	0	0

Temperatures

Macao had an average annual temperature of 23.4°C during 2023, which was 0.6°C higher than the climate normal and was relatively high compared with the climatic mean. The highest and the lowest average temperatures were 29.0°C in July, and 15.4°C in January, respectively. The hottest day was 15 July, when the temperature rose to 36.6°C; whereas the coldest day was 22 December, when the temperature fell to 6.4°C.

Relative Humidity

The average relative humidity during 2023 was 82 percent, which was two percentage points higher than the climate normal. April and May saw the highest monthly average relative humidity, at 89 percent; whereas the lowest was 72 percent in January and December.

Rainfall

Total rainfall during 2023 was at a normal level of 2,176.8 millimetres. The highest monthly rainfall amounts were 514.4 millimetres, recorded in September, which was about 1.4 times more than the climate average for that month; and 295.4 millimetres recorded in October, which was about 2.9 times more than the climate average for that month. Only 2.4 millimetres of rainfall was recorded in November, marking the lowest monthly rainfall of the year. The highest daily rainfall was 213.6 millimetres, on 9 October.

Evaporation

The total evaporation level in 2023 was 810.1 millimetres. Other than January, February, March and July, the monthly evaporation levels were slightly below the climate normal.

Sunshine

During 2023, Macao had 1,960.5 hours of sunshine. The most hours of sunshine were recorded in July, totalling 265.1 hours, which was 53.8 hours above the climate normal for that month. The least hours of sunshine were recorded in April, amounting to 69.8 hours, which was 24.8 hours fewer than the climate normal for that month.

Wind

During 2023, Macao was subject to predominantly northly winds in January, October and December; easterly winds between February and May and in September and November; southerly winds in June and July; and south-southeasterly winds in August. Wind speeds averaged 11.6 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 is responsible for monitoring, analysing and researching, forecasting and warning in the fields of meteorology, aviation meteorology, geophysics and the atmospheric environment.

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 Macau Broadcasting Company (TDM). Every day, SMG officers explain the day's weather conditions and the forecast for the following day during the Macau 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 Macau 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 2023, the system typically operated at 99.9 percent efficiency.

The SMG is committed to promoting meteorological science knowledge through the production of illustrations and videos about science popularisation, and opened the "smgmacau" Instagram account in 2023 to disseminate science knowledge via both conventional and social media platforms.

The SMG received group visits and invited members of civil protection authorities and different

social organisations on field exchanges. During the year, there were 85 visits and ten exchange sessions, with a total of about 2,800 visitors. In addition, the SMG organised a wide range of activities, including the “Weather Fun Day” and two parent-child activities, which attracted a total of 619 participants; and co-organised with the Macao Science Center the “Admire the Clouds and See the Sky” meteorological science popularisation competition, the Meteorology Theatre, the Campus Weather Monitoring Competition and summer courses at the Macao Science Center. Among them, the “Admire the Clouds and See the Sky” meteorological science popularisation competition received more than 2,600 entries and the Meteorology Theatre attracted 3,016 participants.

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 132 Civil Protection CCTV poles in low-lying areas, at conspicuous spots of over 20 entrances and exits of public car parks under the Transport Bureau, and outside the entrances of over 40 social service facilities under the Social Welfare Bureau and the water level monitoring stations of the SMG.

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). Also, the SMG has set up a lightning detection station at the University of Macau and joined the Lightning Location Network in the Pearl River Estuary. 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.

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; a dual-polarisation Doppler weather radar; a set of centralised lightning information processing systems; 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 conduct 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 commenced operations in 2023.

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 28th session of the Conference of the Parties (COP28) to the UN Framework Convention on Climate Change;
- The 18th session of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP 18) and the Fifth session of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (CMA 5);
- The 19th Session of the World Meteorological Organisation (WMO).
- The Regional Conference of World Meteorological Organization (WMO) Regional Association II (Asia);
- The 27th Meeting of the Meteorology Sub-Group of the Asia/Pacific Air Navigation Planning and Implementing Regional Group;
- The 18th Typhoon Committee Integrated Workshop and Roving Seminar; and
- The Sixth Annual Meeting of the Working Group on Meteorology of the Typhoon Committee.

In 2023, the SMG also hosted the 55th Session of ESCAP/WMO Typhoon Committee.

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 2023, roadside monitoring stations in Macao recorded "good" air quality on 70.1 percent of days, "acceptable" air quality on 27.9 percent of days, and "poor" air quality on 1.9 percent of days (seven days). In the high-density residential areas of the Macao peninsula, the air quality was "good" on 51.5 percent of days, "acceptable" on 46.0 percent of days, and "poor" on 2.5 percent of days (nine days).

In the high-density residential area on Taipa, the air quality was “good” on 47.7 percent of days, “acceptable” 50.4 percent of days, and “poor” on 1.9 percent of days (seven days). Ambient monitoring stations on Taipa recorded “good” air quality on 36.7 percent of days, “acceptable” air quality on 54.2 percent of days, “poor” air quality on 8.8 percent of days (32 days), and “very poor” air quality on 0.3 percent of days (one day).







Ambient monitoring stations on Coloane recorded “good” air quality on 39.2 percent of days, “acceptable” air quality on 58.1 percent of days, and “poor” air quality on 2.7 percent of days (ten days). The Ka Ho roadside monitoring station recorded “good” air quality on 38.1 percent of days, “acceptable” air quality on 55.1 percent of days, and “poor” air quality on 6.8 percent of days (25 days).

In 2023, ozone (O₃) was the main pollutant that led to “poor” or “very poor” air quality in Macao, primarily affecting Macao in summer and autumn. However, in March 2023, there were eight days in Taipa Grande where the level of ozone exceeded the daily maximum 8-hour average concentration, marking it the month with the most days of ozone’s level against the standard throughout the year. The Ka Ho roadside monitoring station recorded the greatest number of days that did not meet the air quality standards (the “poor” or “very poor” air quality days), totalling 25 days and representing 6.8 percent of the year. Overall, over 89.3 percent of days met the air quality standards (“good” to “acceptable”) across various districts in 2023.

Average Pollutant Concentrations in 2023

Monitoring Station	Respirable suspended particulates (µg/ m ³)	Fine suspended particulates* (µg/ m ³)	Sulphur dioxide (µg/ m ³)	Nitrogen dioxide (µg/ m ³)	Ozone (µg/ m ³)	Carbon monoxide (mg/m ³)
Roadside	38.2	17.1	---	33.9	---	0.9
High-density residential area of Macao peninsula	42.8	15.0	3.9	40.4	44.7	0.7
High-density residential area of Taipa island	49.7	15.1	4.8	23.5	47.5	0.7
Taipa ambient	39.2	14.8	5.9	21.3	72.5	0.6
Coloane ambient ⁽ⁱ⁾	30.2	16.3	5.3	21.2	64.4	0.6
Ka Ho roadside ^a	41.8	18.4	5.3	20.1	64.9	0.5

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)						

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 2023, the Environmental Protection Bureau and the Public Security Police received 10,091 complaints about ambient noise, about five percent fewer than the 2022 figure. The Environmental Protection Bureau received 1,876 of these complaints, representing a decrease of 13.3 percent compared with 2022; whereas the Public Security Police received the remaining 8,215 cases, 2.8 percent fewer than in 2022.

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” (32.3 percent or 3,255 cases), “public areas” (37.8 percent or 3,820 cases), and “industry, commerce and services” (12.9 percent or 1,306 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 2022 Annual Report on Data Collected by Environmental Noise Monitoring Stations of Macao was published in February 2023.

Light Pollution

Taking into account community concerns about light pollution, the Environmental Protection Bureau updated the Guidelines for the Control of Light Pollution Caused by Billboards, Building Decorative Lights and Outdoor Electronic Displays in 2023 based on research findings, to restrict the operating hours of brightly illuminated structures, and to increase the control requirements and measuring methods for these structures, including those located in nature reserves. The standards and control requirements are similar to those in neighbouring regions.

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 2023, the Environmental Protection Bureau continued monitoring the quality of waters that are under Macao's management, to enable 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 2022 Annual Report on Data Collected by Automatic Water Quality Monitoring Stations of Macao was published in March 2023. 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 Decree-Law No. 46/96/M – Rules and Regulations on Water Supply and Drainage in Macao. It collects samples from different water supply points every day and conducts tests on substances such as physicochemical indicators, organic substances, harmful ions, heavy metals, microorganisms, pesticide residues, and radioactive substances. In 2023, a total of 4,552 samples and 54,101 items were examined, and all the results complied with the required standards, demonstrating that the

water quality of the public water supply system is safe and stable.

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 2023, the Macao Peninsula Sewage Treatment Plant handled 52,010,733 cubic metres of sewage; Taipa and Macau International Airport Sewage Treatment Plants handled 10,143,343 cubic metres; Coloane Sewage Treatment Plant handled 17,524,798 cubic metres; the Cross-border Industrial Zone Sewage Treatment Plant handled 923,404 cubic metres; and the temporary sewage treatment plant near the Outer Harbour Ferry Terminal handled 3,138,539 cubic metres.

The expansion project of the Coloane Sewage Treatment Plant and the construction project of the Sewage Treatment Plant on the artificial island for the Macao border crossing area of Hong Kong-Zhuhai-Macao Bridge were opened to public tender in 2023.

To improve coastal water quality, once the temporary sewage treatment plant near the Outer Harbour Ferry Terminal in Macao became operational, the construction of the temporary sewage treatment plant at Avenida Marginal do Lam Mao officially commenced in March 2023, and the construction of the temporary sewage treatment plant at Inner Harbour South was opened to public tender in December 2023.

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 2023, the CSR collected about 252,064 tonnes of household waste in Macao.

To help implement the Macao Solid Waste Resources Management Programme (2017-2026), the Environmental Protection Bureau has continued to promote the policy of "Waste reduction at source, sorting and recycling".

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 drink stirrers to MSAR, the Executive Order to Prohibit the Import of Non-degradable Disposable Plastic Plates, Cups and Disposable Styrofoam Trays for Food to the MSAR was promulgated in September 2023.

For the sorting 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. 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. The first “Smart Machine for Collection of Food Waste” was set up at the Environmental Protection Fun corner (Mong Ha) in 2022.

In addition, commercial and industrial food waste of small and medium-sized restaurants was collected through the Restaurant Food Waste Recycling Pilot Project, and food waste from government departments, schools, hotels, supermarkets, banks, hospitals, associations and institutions was collected 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 140,000 small bags (100 grammes per bag) and 7,000 larger bags (20 kilogrammes per bag) of fertiliser were distributed by the end of 2023.

In addition, an open tender process for the organic resource recycling centre was initiated in 2023 and there was good progress with related work.

In 2023, the Environmental Protection Bureau again organised the “Recycling Red Packets is Easy” event during Chinese New Year, setting up 58 used red packet distribution points and more than one thousand collection points across Macao, to promote the message on using less new packets, reusing more and making less waste. About 2.31 million red packets were collected (weighing over 6.77 tonnes). After sorting, about 280,000 red packets could be distributed to the public in the following year for reuse in collaboration with associations and organisations, while the rest were sent for recycling.

In addition, the Environmental Protection Bureau again organised the “Recycling Mooncake Boxes is Easy” event during Mid-Autumn Festival in 2023 to promote the environmental message of “reuse first and recycle later”. Over one thousand mooncake box collection points were set

up across Macao, and 19,600 used mooncake boxes (weighing approximately 7.26 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 2023, the centre processed 554,560 tonnes of solid waste, of which municipal solid waste amounted to 501,512 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 2023, the incineration centre supplied 17,277 units (10,000 kWh) of electricity to the public grid. In addition, in 2023 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 2023, the waste treatment centre processed a total of 3,935 tonnes of waste (including medical waste), with discarded tyres comprising 18 percent of the total. To encourage special and hazardous waste producers to carry out waste sorting and reduction and to achieve the polluter-pays principle, the MSAR Government intended to set up a charging system for special and hazardous waste treatment stations, and held a consultation with the industry in 2023 with a view to formulating a draft of the charging system.

Apart from the 20 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 2023, about 680,000 items of used electronic and electrical equipment were collected. Over 190 tonnes of pre-treated circuit boards have been transported in batches to neighbouring regions for subsequent recycling and resource treatment in accordance with the Basel Convention.

Over 1,300 collection points for the Used Battery Collection Scheme have been set up in schools, merchants, shops and institutions' branches, residential and commercial zones, public departments, and public refuse tips in various districts of Macao. By the end of 2023, over 294 tonnes of used batteries had been collected through the scheme.

Over 900 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 81 tonnes of used lamps were collected through the scheme by the end of 2023, of which about 41 tonnes of lighting tubes had been transported to neighbouring regions for subsequent recycling and resource treatment in accordance with the Basel Convention, while the rest were temporarily stored in the plants of the contracted companies.

By the end of 2023, a total of 142 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 electronic appliances and devices, used batteries, lamps, glass bottles and the “three-colour resources” (paper, plastic and metal/aluminium cans). Since 2023, the service hours of the mobile recycling vehicles have been further optimised. In the event of cancellation of collection service due to inclement weather, the collection service will be postponed, and held two days later at the same time and place.

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 2023, about 1.68 million cubic metres of construction waste were disposed of. In addition, a mobile inert construction and demolition waste sorting facility was set up in 2023 for sorting and stockpiling compliant materials for use in the expansion and reclamation project of the Macau International Airport.

Legislation and Pollution Control

Legislation enacted in 2023 covering environmental issues included:

1. Prohibition of Import and Transshipment of Oil-Based Paints and Varnishes Used for Vehicle Repairs That Exceed Volatile Organic Compounds Content Limits (Executive Order No. 67/2023);
2. Substitution of Table 1 of Schedule of By-law No. 30/2016 - Limit for Exhaust Gas Emissions from In-use Vehicles and Methods of Measurement, as amended by Executive Orders No. 130/2018, No. 80/2019, No. 131/2020, No. 79/2021 and No. 92/2022 (Executive Order No. 92/2023);
3. Prohibition of Import of Non-degradable Disposable Plastic Plates, Cups and Disposable Styrofoam Trays for Food to Macao Special Administrative Region (Executive Order No. 146/2023);
4. Plan for Granting Financial Support for Scrapping Obsolete Motorcycles and Their

Replacement with New Electric Motorcycles (Second Phase) (Order No. 21/2023 from the Secretary for Transport and Public Works); and

5. Plan for Granting Financial Support for the Scrapping of Old Diesel-Powered Vehicles (Second Phase) (Order No. 22/2023 from the Secretary for Transport and Public Works);

International Treaties

New international agreements and treaties made applicable to Macao in 2023 included:

1. Amendments to the Stockholm Convention on Persistent Organic Pollutants, passed on 15 May 2015 and 5 May 2017.

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, all approved subsidies under the Recycling Industry Equipment and Vehicles Subsidy Scheme have been disbursed, and the scheme is being implemented in accordance with requirements.

To further improve Macao air quality and achieve the dual carbon goals of the country, in 2022 and 2023 the Environmental and Energy Conservation Fund launched 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 – both involving two phases – to encourage owners to replace their older, more polluting motorbikes with new electric motorbikes, and to phase out older and more polluting diesel vehicles.

Plan for Granting Financial Support for the Scrapping of Obsolete Motorcycles and Their Replacement with New Electric Motorcycles

	Application deadline	No. of applications received (As of the end of 2023)	No. of applications vetted (As of the end of 2023)	No. of obsolete motorcycles scrapped (As of the end of 2023)	No. of new motorbikes registered (As of the end of 2023)
1st Phase	31 March 2023	1,822	1,822	1,777	1,761
2nd Phase	31 May 2024	755	696	607	478

Plan for Granting Financial Support for the Scrapping of Old Diesel-Powered Vehicles

	Application deadline	No. of applications received (As of the end of 2023)	No. of applications vetted (As of the end of 2023)	No. of obsolete diesel vehicles scrapped (As of the end of 2023)
1st Phase	15 March 2023	313	313	296
2nd Phase	31 May 2024	256	231	147

Promotion of Environmental Protection Education

With the theme “Building a Low Carbon Macao and Embracing a Green Life”, the Environmental Protection Bureau organised 404 diverse events during 2023, attended by 472,787 participants.

The Environmental Protection Bureau continued to conduct publicity in the community to enhance merchants’ understanding of the Restrictions on the Provision of Plastic Bags law; and continued to communicate with the convention and exhibition industry to conduct publicity on the law, reminding industry members that the Restrictions on the Provision of Plastic Bags law applies to retail practices in convention and exhibition activities, with the expectation that the industry would comply with the regulations. In addition, the bureau established a platform to encourage merchant to donate the plastic bag charge to environmental and social welfare organisations.

The second phases 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 were officially opened for applications on 1 June 2023. In May 2023, the Environmental Protection Bureau joined hands with related departments to conduct briefings for businesses, associations, vehicle owners and environmental organisations, to explain the schemes and points to note.

The Executive Order – Prohibition of Import of Non-degradable Disposable Plastic Plates, Cups and Disposable Styrofoam Trays for Food to the Macao Special Administrative Region officially came into effect on 1 January 2024. The Environmental Protection Bureau continued to carry out publicity on the law, and held a briefing session for relevant trade associations and suppliers in September 2023, to ensure the effective implementation of the control measures.

To support the publication of the Guidelines on Environmental Monitoring and Auditing (2023 Edition), the Environmental Protection Bureau organised a workshop on environmental monitoring and auditing in October 2023, to introduce the guidelines and the practical operation of environmental monitoring work, and invited professional organisations to share their experience and exchange ideas, in order to deepen Macao industry’s understanding of and capability in environmental monitoring work, and to promote the exchange of technical skills between industry practitioners, thereby enabling the industry to more effectively implement environmental monitoring work.

In November 2023, the Environmental Protection Bureau carried out publicity on environmental laws in the community and organised a briefing session on the law on Prevention and Control of Environmental Noise together with the Public Security Police and related organisations for external employers, to promote the message of “caring for one another by not causing a noise nuisance” to different groups, in order to create a quiet and harmonious community environment.

Since its launch, the Environmental Fun Bonus Points Scheme has gained popular support from the public. Environmental Protection Fun - waste reduction and recycling encouraged the public to participate in sorting and recycling waste, while Environmental Protection Fun - environmentally-friendly moves encouraged the community to participate in a variety of green behaviour, including through the coordination of a group of frontline teams (Environmental Protection Fans) to assist in guided tours of Cotai Nature Reserve. By the end of 2023, there were 52 community recycling stations (including Environmental Protection Fun corners, the Environmental Protection Fun clean collection spots, the Environmental Protection Fun collection points and mobile recycling vehicles) and 67 Smart Recycling Machines across Macao.

The Environmental Protection Fun Corner continued to fulfil its functions of recycling and environmental education for the community, and became the centre of environmental education for the community. It also regularly organised guided tours for the public, enabling the public to visit the corner’s facilities, learn about the recycling process, participate in workshops on waste recycling, and bring items for recycling or sharing at the corner, to put clean recycling and reuse of waste into practice. By the end of 2023, 10 tours had been organised for a total of 156 participants; and 279 tours had been organised for schools, organisations, associations and institutions, with a total of 6,430 participants.

The Environmental Protection Bureau organised a series of environmental education events and the Green School Award Project through the Green School Project. In 2023, 52 schools participated in the Green School Awards Project with the theme “Reduce Plastic and Save Energy for the Love of the Earth; Waste Reduction at Source Depends on You”, with 35 schools receiving awards, while 26 teams and 51 groups were awarded the Environment Education Pedagogical Project Awards and Green Campus Fun Awards, respectively.

The “Macau Green Hotel Awards” entered its 16th edition in 2022, with a total of 27 hotels winning awards, bringing the total number to 54 (the award is valid for 3 years). The award-winning hotels actively supported the MSAR Government’s environmental protection policy by formulating emission reduction measures in the areas of energy reduction, transportation and general waste management. The number of electric vehicles charging facilities in award-winning hotels increased to more than 200, representing an increase of about 50 percent compared with 2021; some of these facilities are open to the public, with electric motorbike charging facilities accounting for about 30 percent of the total. In addition, 40 percent of the award-winning hotels have adopted the use of electric vehicles, while 20 percent have adopted the use of natural gas vehicles.

Regarding waste management, over the years, the total amount of waste collected by the award-winning hotels has exceeded 64,000 tonnes, including more than 19,000 tonnes of waste paper. To date, about 80 percent of the award-winning hotels have collected food waste, totalling nearly 9,000 tonnes, and some of the hotels installed food waste treatment machines.

The Environmental Protection Bureau continued the Scheme for Recognition of Eco-Supermarkets in collaboration with the Municipal Affairs Bureau, the Consumer Council, the Macau Merchandise Merchants Industry Chamber of Commerce and the Macau Union Suppliers Association, with a total of 43 supermarkets receiving awards in 2022. The award-winning supermarkets have continued to implement environmental protection measures such as plastic wrapping reduction, waste reduction and recycling as well as energy saving and emission reduction, to support the Government's environmental protection efforts.

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 2023, a total of 1,314 tonnes of clothes were collected.

In addition, by the end of 2023, more than 200 restaurants had participated in the "Cherishing Food is Easy" programme; about 800 buildings had participated in the "Recycling in Buildings is Easy" programme; over 2.39 million customer requests had been recorded for the "Reducing Plastic is Easy" scheme, and it was estimated that 5.2 million sets of disposable utensils had been saved; and a total of 83 drinking water dispensers had been set up for "Bringing Your Own Water Bottles is Easy" campaign in various districts in Macao, with over 3.88 million plastic bottles saved.

The Environmental Protection Bureau continued to promote the Food Waste Reduction in Macao Food Festival Scheme, to highlight environmental messages, including on using environmentally friendly utensils, waste sorting and recycling, food waste recycling and food saving, and set up booths to promote the concept of waste reduction at source. 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 Wetlands Day, Earth Day, World Environment Day, and encouraged the public to participate in environmental activities and put environmental protection into practice.

The World Wetlands Day is celebrated on 2 February. The Environmental Protection Bureau held the World Wetlands Day 2023 - Environmental Protection Fans Award Ceremony and "Recycling Red Packets is Easy" launch ceremony on 14 January 2023 at Cotai Nature Reserve.

The Government has supported the Earth Hour campaign launched by World Wide Fund for Nature (WWF) for 15 consecutive years. Under the coordination of the Environmental Protection Bureau, the campaign mobilised government departments, entertainment complexes and some large industrial and commercial corporations to turn off unnecessary lights according to their own circumstances for one hour, from 8:30pm to 9:30pm, on 25 March 2023.

On 22 April, Earth Day, the Environmental Protection Bureau in collaboration with the Marine and Water Bureau and the Municipal Affairs Bureau organised the "Cleaning Beach is Easy" activity at Hac Sa Beach, with about 40 teachers and students joining hands to clean the beach to raise public awareness of environmental protection.

In response to World Environment Day on 5 June 2023, the Environmental Protection Bureau launched the World Environment Day 2023 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” and “5% Energy Saving” lucky draw.

Regional Cooperation on Environmental Protection

In terms of international environmental cooperation, the Environmental Protection Bureau participated in the Fifth Meeting of the Conference of the Parties to the Minamata Convention on Mercury held in Geneva, Switzerland, and the 28th Session of the Conference of the Parties to the United Nations Framework Convention on Climate Change held in Dubai, United Arab Emirates, in October and December 2023, respectively; the 18th session of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol and the Fifth session of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement – participating together with the national delegation; the 2023 Technical Coordination Group Meeting on the Stockholm Convention Implementation in China, held in Weifang City, Shandong Province in November 2023; and the 21st China International Environmental Protection Exhibition, held in Beijing.

To strengthen exchanges and cooperation on environmental protection between mainland China and Macao, the Macao SAR Government and the Ministry of Ecology and Environment signed the Agreement on Cooperation in Environmental Protection between Mainland China and the Macao SAR. The Minister of Ecology and Environment led a delegation to visit the Ministry of Ecology and Environment in April 2023, and the two parties held the first inter-ministerial liaison work conference.

The Macau International Environmental Co-operation Forum and Exhibition 2023 (MIECF 2023) was organised by the MSAR Government from 17 August to 20 August 2023, 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 “Building an Ecological Civilisation Through Innovative Initiatives”.

MIECF invited over 30 local and overseas experts and academics to discuss cutting-edge issues such as green and low-carbon, sustainable and high-quality development, covering topics including business and leisure tourism, green innovation, innovative pollution control and cooperation in the environmental protection industry in the Pan-Pearl River Delta region. A Green Showcase featured seven exhibition zones covering construction, finance, food and beverage, transportation, water resources, energy-saving and environmental protection technologies, and waste management. It attracted 40 international exhibitors, and incorporated a Green Living Zone and a Green and Low-Carbon Project Zone featuring a wide range of new eco-technology products, as well as exhibitions on food waste systems, environmentally friendly utensils and electric vehicles. A carbon inclusion

element was also introduced for the first time on the Green Public Day, to encourage the public to take action to reduce carbon emissions.

Regarding environmental cooperation in the Pan-Pearl River Delta Region, the Environmental Protection Bureau attended the 19th Coordinator Working Meeting of the Joint Conference on Pan-Pearl River Delta Regional Environmental Protection Cooperation and the 19th meeting of the Joint Conference on Pan-Pearl River Delta Regional Environmental Protection Cooperation in July and September 2023, respectively.

In August 2023, Guangdong, Hong Kong and Macao jointly announced the 2022 Report of the Guangdong-Hong Kong-Macao Pearl River Delta Regional Air Quality Monitoring Network, which shows that there has been continuous improvement in the air quality of the Pearl River Delta Region.

Under the Guangdong-Macao Environmental Protection Cooperation Agreement, the two parties convened the Guangdong-Macao Environmental Cooperation Working Group Meeting in February 2023, to exchange views on regional air monitoring, water environment management, recycling scrapped vehicles and waste paper, environmental industries, publicity and education. In addition, representatives of the Environmental Protection Bureau and the Guangdong Department of Ecology and Environment had a meeting in December to exchange preliminary views on the categories of waste to be handled inter-regionally through collaboration.

Regarding Hong Kong-Macao environmental cooperation, in July 2023 the 15th Meeting on Environmental Protection Cooperation between Hong Kong and Macao was convened in Macao. The parties exchanged views on coastal water quality improvement, promotion of electric vehicles and environmental exhibitions and seminars, and discussed plans for future cooperation. In addition, the Environmental Protection Bureau sent a delegation to attend the Eco Expo Asia 2023 and the presentation ceremony of the Hong Kong Awards for Environmental Excellence and Hong Kong Green Organisation Certification, in Hong Kong.

Under the framework of the Zhuhai-Macao Environmental Protection Cooperation Agreement, the Zhuhai-Macao Environmental Cooperation Working Group Meeting 2023 was held in October 2023. 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. In addition, the Environmental Protection Bureau sent a delegation to attend the Themed Activities of World Environment Day 2023, held in Zhuhai.

Environmental Protection Planning in Macao

The Environmental Protection Bureau continued to make progress with the various tasks involved in the Implementation of the Environmental Protection Plan of Macao (2021-2025).

To support the national goal of “dual carbon”, in December 2023 the Environmental Protection

Bureau announced the Long-term Strategy for Carbon Reduction in Macao, which serves as a blueprint for the region's efforts in carbon reduction. On the basis of the Strategy, the Environmental Protection Bureau has formulated a special scheme, Macao Electric Vehicle Promotion Scheme, for the land transportation sector – proposing goals and policy measures regarding different types of vehicles, charging equipment and infrastructure, to facilitate the land transportation sector's progress towards near-zero emissions.

In January 2023, the Environmental Protection Bureau published the Guidelines on Environmental Monitoring and Auditing (2023 edition), which provides the business sector with specifications for compiling the Environmental Monitoring and Audit Plan chapters in environmental impact assessment reports, and explains the work involved in implementing an environmental monitoring plan.

In December 2023, the Environmental Protection Bureau published the Guidelines on Environmental Impact Assessments for Planning (2023 edition), which regulate the assessment criteria and technical requirements of environmental impact assessments for urban planning, to assist planning departments with making recommendations and proposing mitigation measures.

Environmental Data

In June 2023, the Environmental Protection Bureau published the Report on the State of the Environment of Macao 2022, 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 2023:

Category	Number of cases
Noise	1,689
Air pollution	505
Noise and air	98
Noise and other	89
Air and other	56
Environmental hygiene	53
Other	161
Total	2,651

Technical advice provided at the request of other departments in 2023:

Department	Premises and projects	Nos.
Macao Government Tourism Office	Premises including karaoke bars, bars, hotels, restaurants, sauna and massage establishments, dance halls and health clubs.	339
	Inspections before issuance or renewal of licences	128
Economic and Technological Development Bureau	Technical advice	27
	Inspection of industrial sites	4
	Technical advice on import applications for HCFCs as “Controlled Substances” under Decree-Law No. 62/95/M	51
Land and Urban Construction 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	240
	Maps of urban conditions	100
	Technical advice	77
Municipal Affairs Bureau	Technical advice on licensed premises	249
	Site inspections	153
	Project plans	10
	Technical advice	14
Marine and Water Bureau	Technical advice	20
Public Works Bureau	Project plans	446
	Technical advice	110
Customs	Inspection	81
Other departments	Technical advice	47

Moreover, in 2023 the Environmental Protection Bureau provided 305 technical recommendations on environmental planning assessment areas, and received eight environmental impact assessment reports on new projects and related information.

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 (*Raphiolepis 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*), Cochinchina 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, 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 to ten metres from 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 bore 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 was completed in August 2023, with a recovery area of about 35 hectares; the fifth phase of woodland recovery plan, with a recovery area of 35 hectares, was completed in November 2023. About 35,000 saplings were planted during both phases. In addition, the sixth phase of the woodland recovery plan, covering 35 hectares of area, commenced in May 2023, with thinning, digging of tree holes and backfilling of planting materials completed. It is expected planting will commence in the first quarter of 2024, with about 43,000 saplings of indigenous South China trees to be planted, by which time the target of recovering a total area of 120 hectares of woodland will be achieved.

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 (*Callosciurus erythraeus*) is an exotic species, which has now become established in the wild in Macao. Its lack of natural enemies makes it a threat to other animal species, notably as squirrels eat bird eggs, thus endangering birds' reproductive success.

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. Between January 2023 and April 2023, 101 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. 83/2023 –

List of Protected Old and Valuable Trees, promulgated on 19 June 2023, 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 2023, the Cotai Nature Reserve's known plant species included 319 species of planktonic algae, four species of bryophyte, 22 species of pterophyte, 11 species of gymnosperm, and 406 species of flowering plants. Regarding animal species, 143 plankton species, 176 zoobenthos species, 652 species of insects, 116 species of fish, five species of amphibians, 22 species of reptiles and 12 species of mammals were recorded. The abundant food resources have attracted 197 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 two 300-square metre outdoor yards. 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 Estevao Eusebio Situ Road. 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, a trail and a camellia garden, 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 and Little Spring; as well as barbecue, and picnic areas; an outdoor experience camp; and a freshwater-wetland ecological zone.

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 project's completion.

Population

Macao's resident population was 683,700 at the end of 2023, representing an increase of 10,900, or 1.6 percent, over the previous year. An estimated 46.6 percent of Macao's population were males, and 53.4 percent were females.

The local population was 571,200 at the end of the year, representing an increase of 500, or 0.1 percent, over the previous year. The number of foreign employees residing in Macao increased by 9.5 percent to 86,500, while the number of foreign students residing in Macao increased by 12.6 percent to 26,000.

Natural factors are among the reasons for the increase in population. In 2023, there were 3,712 new-born babies, 14.5 percent fewer than in 2022, and 2,981 deaths, 0.8 percent fewer than in 2022. The natural population growth rate reached a new low, dropping to 0.11 percent. The median age of mothers giving birth to their first child was 31.0 years old, the same as in 2022.

On top of this increase, there was a change in immigration, another factor influencing population. The net number of immigrants was 10,100 in 2023, largely attributed to more foreign employees residing in Macao.

Regarding the population distribution by statistical district, most residents lived in Baixa da Taipa, with 75,100 residents, comprising 11.0 percent of the total population, followed by Areia Preta New Reclamation Zone (10.2 percent) and Areia Preta and Iao Hon Districts (9.9 percent). New Outer Harbour Reclamation Area (NAPE) (+1,400 residents), Baixa da Taipa (+1,200 residents) and Universidade e Baía de Pac On districts (+1,200 residents) saw the highest increases in population compared to 2022.

Birth and Death Rates

In 2023, the birth rate was 0.55 percent, representing a drop of 0.09 percentage points, while the death rate was 0.44 percent, remaining at the same level as in 2022.

Population Ageing

Macao's population is ageing because of the increasing life expectancy. Senior citizens (aged 65 years or above) made up 14 percent of the population, 0.7 percentage points more than the previous year; the number of other adults (aged 15-64 years) increased by 0.2 percentage points, representing 72.8 percent of the population; the population of young children decreased by 0.9 percentage to 13.2 percent. For the first time, the population of elderly residents exceeded that of children, with the aging index rising to 106.1 percent.

The ageing in the population of Macao people is more significant, with 16.7 percent represented by senior citizens (aged 65 years or above), and 67.5 percent by other adults (aged 15 years to 64 years). The elderly dependency ratio of the population of Macao people was 24.8 percent, which means there was one senior citizen for every four adults.

Identification Services 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 Services 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 2023, the Identification Services Bureau had issued 917,781 MSAR Passports and 61,418 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 Services 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 458,604 such permits as at 31 December 2023.

The Identification Services Bureau is also responsible for issuing Macao SAR Resident ID cards. As at 31 December 2023, there were 747,868 Macao SAR Resident ID card cardholders. Between 1 January 2023 and 31 December 2023, 10,442 residents received Macao SAR Resident ID cards for the first time.

Nationality

Under Law No. 7/1999, the Identification Services 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 2023, 1,429 applications for naturalisation were approved; 582 people restored their Chinese nationality; 116 renounced their Chinese nationality; 4,005 successfully applied to adopt Chinese nationality; 82 opted for Portuguese nationality; and there were nine 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 2023, the Identification Services Bureau issued 85,812 certificates of entitlement to right of abode.

Certificate of Criminal Record

In August 1996, the Identification Services 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 2023, the bureau issued a total of 83,888 certificates of criminal record. Of these, 69,874 were in response to public applications, and 14,014 were for agency applications. Among the 90 certificates of special record for minors that were issued, five were to public bodies, and 85 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 2023, 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.

Legal Immigration

In 2023, the number of new immigrants from mainland China holding one-way permits increased by 1,061 from the previous year, to 3,236, with the number of new immigrants from Guangdong province increasing by 663 to 2,165, 68.08 percent of whom were female and 31.92 percent were male. Among new immigrants, 30.01 percent were aged below 30 years, representing a drop of 0.61 percentage points.

Overstaying and Illegal Entry

In 2023, 14,775 overstayers were repatriated. They included 14,242 mainland China residents, 72 Taiwan region residents, 39 Hong Kong residents, 422 foreign nationals, and 12,998 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 3,764 registered births during 2023.

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 3,168 marriages were registered during 2023.

Death Registration

Family dependents or other relatives of a deceased person may register his or her death with the Civil Registry. There were 3,533 deaths registered during 2023.

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 634 divorce applications during 2023.



Star on Coast - Leisure Zone



Star on Coast is a new landmark on the waterfront of Macao's south shore, between the Kun Iam Statue Waterfront and Macao Science Center. The multi-functional, comprehensive zone is packed with a kids' play zone, a leisure and sport area, dining options and art elements. Residents and visitors can take a leisurely stroll along the coastline to enjoy the stunning sunset view, the city skyline and the nightscape along the south shore, to tune in to the relaxing and romantic ambience.



