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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 32.9 square kilometres in 2020. The Macao peninsula accounts for 9.3 square kilometres (28.3 percent) of the current area; Taipa island for 7.9 square kilometres (24 percent); Coloane island for 7.6 square kilometres (23.1 percent); COTAI Reclamation Area for six square kilometres (18.2 percent); New Urban Zone Area A for 1.4 square kilometres (4.3 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%), 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 23.8 square kilometres, accounting for 72.3 percent of the total; granite hills cover six square kilometres, or 18.2 percent; and terraces cover 1.2 square kilometres, or 3.7 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 5.8 percent of the total land area.

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

## Coastline Assessment

According to Executive Order No. 184/2018 enacted on 13 August, the coastline of the Macao SAR was determined by the published Macao Special Administrative Region Coastline Map, dated 1 July 2017. The total length of Macao's coastline is 76.7 kilometres, 18.4 kilometres of which are around the Macao peninsula; 49.9 kilometres are around the two islands (including Taipa Island, Cotai Reclamation Area and Coloane Island); 5.7 kilometres are around New Urban Zone Area A; 2.7 kilometres are around the Macao border crossing area on Zhuhai-Macao Port Artificial Island of the Hong Kong-Zhuhai-Macao Bridge.

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

## Climate

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

According to the climate normals of the World Meteorological Organisation (WMO), calculated with 30 years of data, the average annual precipitation in Macao between 1991 and 2020 was more than 1,966.6 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 22.6°C. The coolest month is January, when it averages 15.1°C. Most years, Macao has a short cold weather period when temperatures fall below 5°C. The average monthly temperature exceeds 22°C during seven months of the year, indicating that Macao has a short winter but a long summer.

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

## Weather Overview

### General Situation

In 2020, Macao's average annual temperature and the relative humidity were slightly higher than the climate normal, the total rainfall was slightly lower than the climate normal, while the total hours of sunshine were higher than the climate normal, and the total evaporation level was slightly below the climate normal.

Five tropical cyclones affected Macao in 2020. They were: Tropical Storm Nuri from 12 June to 14 June, Tropical Storm Sinlaku from 31 July to 2 August, Typhoon Higos from 17 August to 19 August, Severe Tropical Storm Nangka from 11 October to 14 October, and Typhoon Saudel from 22 October to 24 October.

During Typhoon Higos, Typhoon Signal No. 10 was issued and gale force 8 or above winds were recorded over Macao, while hurricane force 12 winds were recorded over the cross-harbour bridges. The maximum 10-minute mean wind speed was 138.6 kilometres per hour. During Severe Tropical Storm Nangka, Typhoon Signal No. 8 was issued.

Regarding storm surge warnings, blue storm surge warnings were issued as a result of Tropical Storm Sinlaku and Tropical Storm Nangka, and yellow, orange and red storm warnings were issued during Tropical Storm Higos, which caused flooding in extensive areas of the Inner Harbour, with the maximum flood height of 0.82 metres recorded on 19 August.

Summary of Severe Weather Warnings Issued in 2020			
Warning / Signal Type		Frequency	No. of Warning Reports Issued
Tropical Cyclone Warning	No. 1 Alert Signal	4	16
	No. 3 Strong Wind Signal	5	41
	No. 8 Northeast Gale Signal	2	14
	No. 8 Southeast Gale Signal	1	3
	No. 8 Southwest Gale Signal	0	0
	No. 8 Northwest Gale Signal	0	0
	No. 9 Increasing Gale Signal	1	3
	No. 10 Typhoon Signal	1	3
	All Signals Lowered	5	5
Strong Monsoon Warning (Black Ball)		19	23
Rainstorm Warning		10	16

(Cont.)

Summary of Severe Weather Warnings Issued in 2020			
Warning / Signal Type		Frequency	No. of Warning Reports Issued
Thunderstorm Warning		110	72
Storm Surge Alert		0	0
Storm Surge Warning	Blue Storm Surge Warning	2	14
	Yellow Storm Surge Warning	1	2
	Orange Storm Surge Warning	1	5
	Red Storm Surge Warning	1	1
	Black Storm Surge Warning	0	0
	All Warnings Lowered	3	3

## Temperatures

Macao had an average annual temperature of 23.3°C during 2020, which was 0.7°C higher than the climate normal. The highest and the lowest average temperatures were 29.1°C in July and 16.4°C in December, respectively. The hottest day was 14 July, when the temperature rose to 35.5°C; whereas the coldest day was 31 December, when the temperature fell to 6.7°C.

## Relative Humidity

The average relative humidity during 2020 was 82 percent, which was three percent higher than the climate normal. March saw the highest monthly average relative humidity, at 91 percent; whereas the lowest was 68 percent in December.

## Rainfall

Total rainfall during 2020 was 1,713.2 millimetres, which was 344.9 millimetres, or about 17 percent below climate normal. The highest monthly rainfall was 442.0 millimetres, recorded in August, 98.9 millimetres above normal. Only 0.2 millimetres of rainfall were recorded in December, marking the lowest monthly rainfall of the year. The highest daily rainfall was 152.2 millimetres, recorded on 30 May.

## Evaporation

The total evaporation level in 2020 was 816.7 millimetres, which was 128.4 millimetres less than

the climate normal. Except for February, April and July, the evaporation levels of the remaining months were slightly lower than the climate normal.

## **Sunshine**

During 2020, Macao had 1,856.3 hours of sunshine, 82.4 hours above normal. The most hours of sunshine were recorded in July, totalling 276.7 hours, which was 53.5 hours above normal, followed by June totalling 222.9 hours of sunshine, which was 67.6 hours above normal. The least hours of sunshine were recorded in March, amounting to 57.3 hours, which was 14.2 hours less than normal.

## **Wind**

During 2020, Macao was subject to predominantly easterly winds in January, March and September; north-northeasterly winds in February, April, October and November; southerly winds from May to July; south-southeasterly winds in August, and northerly winds in December. Wind speeds averaged 10.6 kilometres per hour.

## **Weather Services**

### **Meteorological and Geophysical Bureau**

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

Apart from hourly real-time weather information, the SMG issues various types of daily weather forecasts for the public, government departments and private institutions. These include five weather reports and forecasts, two marine and weather forecasts for the Macao coastal area, as well as daily weather reports over the past year, which are broadcast daily for the public. The SMG provided 1,824 weather forecasts and 732 weather forecasts for the Macao coastal area during 2020.

The SMG continued cooperating with the Macau Broadcasting Company's (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 a forecast of a substantial drop 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.

In addition, a new alert service for hot and cold weather was launched in December 2020, to allow residents to prepare in advance for high or low temperatures.

The SMG continued providing Weather Forecasts for Holidays with vivid and interesting images, while adding “Special Push Notifications” before the occurrence of special weather conditions and notable days, such as the first day of school, Chinese solar terms, and before significant temperature drops.

Whenever a tropical cyclone signal is issued, the SMG will provide 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 of the weather. The bureau also set up a “Weather Services Centre” at the Outer Harbour Ferry Terminal to provide tourists with the latest weather advice and meteorological information.

To enhance rainstorm warnings and allow various groups in society to take proper contingency measures, the Rainstorm Warning System approved by Executive Order No. 17/2020 came into effect on 1 September 2020. The new rainstorm warning system has three main levels: amber, red and black, to reflect the impact and risk level of rainstorms with different intensities. At the same time, the safety alerts in the Thunderstorm Warning Signals were enhanced.

To enhance public understanding of the new Rainstorm Warning System, the SMG launched a series of publicity activities, including promotional videos, advertisements and briefing sessions.

The SMG strived to educate the public about weather and disaster relief, and cooperated with other organisations in holding talks to introduce common adverse weather conditions and corresponding safety measures.

In 2020, the SMG held a four-panel comic drawing competition and worked with the Science Museum to organise various activities such as Campus Weather Monitoring Competition, a weather drama – “Storm Chasing Guardians”, and a “Little Weather Reporters” summer course, to enhance students’ knowledge of meteorological science and disaster prevention through interactive, diverse approaches.

The SMG also added the “Weather Fun Facts” column to the website, to provide the public with knowledge of meteorology, air quality, earthquakes, radiation, and tsunamis in a light-hearted way, explaining and exploring the causes of various weather phenomena. Due to the pandemic, the number of visits in 2020 decreased significantly. From October to December 2020, seven school classes and groups visited the SMG, totalling 173 visitors.

During 2018, the SMG posted Storm Surge Alert labels onto the Civil Protection CCTV poles in low-lying areas. By 2020, labels had been posted on 130 poles. The SMG worked with the Social Welfare Bureau to post Storm Surge Alert Labels outside more than 40 of its local social service facilities in low-lying areas, and design new Storm Surge Alert Labels. In addition, the SMG produced promotional videos and launched advertisements on some buses to promote storm surge warnings and response measures to the public.

The SMG has established the Aeronautic Meteorological Center at Macao International Airport to provide aviation weather services for airport operators and flight crews.

All international flights departing Macao can receive the most up-to-date, international standard aeronautical meteorological documents via the Aviation Weather Information System (AWIS). In 2020, the system typically operated at 99.8 percent efficiency.

In addition to the existing airport warning services (including thunderstorm and strong wind warnings), an Aerodrome Severe Convective Weather Tips (ASCWTips) service was introduced in June 2020, to help users make work arrangements before adverse weather conditions, and minimise the impact on overall airport operations.

The SMG also offered the 48-hour Automatic Weather Forecast and Real-time Air Quality Index services, providing the public with temperature, humidity, wind speed and direction, and weather forecasts for the following two days and a more timely air quality index on the website.

In 2020, the SMG developed a series of contingency plans to ensure the basic and emergency services of the 24-hour Meteorological Monitoring Centre would continue during the special circumstances arising from the COVID-19 pandemic.

## **Monitoring Network**

The SMG collects weather data 24 hours a day via its Automatic Weather Station Network of 16 weather-observation stations in key locations around Macao. Three of these automatically send information every 15 minutes to destinations worldwide, using the international SYNOP code and the Global Telecommunications System (GTS). This forms part of the Pearl River Delta Real-time Automatic Weather Station Network, which was jointly established to exchange meteorological data by the Guangdong Provincial Meteorological Bureau, the Hong Kong Observatory and the Macao SMG.

The SMG also teamed up with the Hong Kong Observatory to establish a substation of the Pearl River Delta Lightning Location Network in Macao. The system operates around the clock, and provides real-time lightning information for the Pearl River Delta. Two lightning systems with real-time monitor interface were also established in 2018.

Regarding meteorological telemetry, the SMG has two ground meteorological reception and processing systems to receive Japanese Himawari-8 satellite information and Chinese FY-2G satellite information, respectively; two dual-polarisation Doppler weather radars; three low-level wind profilers; two microwave radiometers; two cloud height meters; four visibility measuring devices; and two lightning sensors to monitor lightning in the skies over Macao and the vicinity. In addition, the SMG joined hands with the Zhuhai Meteorological Bureau to install four X-band phased array weather radars in Zhuhai, forming a network of phased array radars to monitor weather conditions over Macao and nearby regions.

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, two tide monitoring stations set up along the coast, and

one inshore wave monitoring station.

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

### **Air quality monitoring**

The SMG established the Air Quality Monitoring Project in partnership with Companhia de Electricidade de Macao (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 and a light detection and ranging (LIDAR) system for monitoring suspended particulates and mixing layers above Macao.

### **Seismological monitoring**

The SMG has a seismological monitoring station in its Taipa Grande headquarters on Taipa, equipped with a digital seismograph and a deep shaft (30 metres from 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.

### **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. Due to the COVID-19 pandemic in 2020, all

meetings and exchange activities were conducted through video conferencing.

Domestic meetings included the Guangdong-Hong Kong-Macau 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 52nd Session of ESCAP/WMO Typhoon Committee;
- The First Session of the Commission for observation, infrastructure and information systems (INFCOM) of WMO;
- The 16th Session of the Forum on Regional Climate Monitoring-Assessment-Prediction for Asia (FOCRAII);
- WMO RA II Hydrological Advisers Forum;
- Webinar on the implementation of the ICAO Meteorological Information Exchange Model (IWXXM);
- The 24th Meeting of the Meteorology Sub-group of the Asia Pacific Air Navigation Planning and Implementation Regional Group;
- The Third Session of the Meeting of Meteorological Working Group of the Typhoon Committee; and
- The 15th Typhoon Committee Integrated Workshop and Roving Seminar.

## **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.

#### **Air**

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.

During 2020, roadside monitoring stations in Macao recorded “good” air quality on 69 percent of days, and “acceptable” air quality on 31 percent of days. In the high-density residential areas of the Macao peninsula, the air quality was “good” on 81 percent of days, and “acceptable” on 19 percent of days.

In the high-density residential area on Taipa, the air quality was “good” on 84 percent of days, and “acceptable” on 16 percent of days. Ambient monitoring stations on Taipa recorded “good” air quality on 53 percent of days, “acceptable” air quality on 43 percent of days, and “poor” air quality on four percent of days (15 days). Ambient monitoring stations on Coloane recorded “good” air quality on 60 percent of days, “acceptable” air quality on 37 percent of days, and “poor” air quality on three percent of days (10 days). The Ka Ho roadside monitoring station recorded “good” air quality on 52 percent of days, “acceptable” air quality on 44 percent of days, and “poor” air quality on four percent of days (16 days).

In 2020, ozone ( $O_3$ ) was the main pollutant that led to “poor” air quality in Macao, primarily affecting Macao in autumn. The ambient monitoring stations on Ka Ho roadside monitoring station recorded most of the “poor” air quality, on four percent of days respectively (16 days). Overall, over 96 percent of days met the air quality standards (“good” to “acceptable”) across different districts in 2020. As compared to 2019, concentrations of various types of pollutants were largely unchanged.







### Average Pollutant Concentrations in 2020

Monitoring Station	Respirable suspended particulates ( $\mu\text{g}/\text{m}^3$ )	Fine suspended particulates ( $\mu\text{g}/\text{m}^3$ )	Sulphur dioxide ( $\mu\text{g}/\text{m}^3$ )	Nitrogen dioxide ( $\mu\text{g}/\text{m}^3$ )	Ozone ( $\mu\text{g}/\text{m}^3$ )	Carbon monoxide ( $\text{mg}/\text{m}^3$ )
Roadside	38.9	18.6	---	53.1	---	1.0
High-density residential area of Macao peninsula	47.9	17.2	3.2	30.9	29.8	0.7
High-density residential area of Taipa island	50.8	18.4	3.6	27.2	34.1	0.6
Taipa ambient	28.9	13.6	2.1	21.3	60.4	0.6
Coloane ambient <sup>(i)</sup>	33.6	17.8	4.0	26.6	56.5	0.7
Ka Ho roadside <sup>a</sup>	36.4	18.4	3.5	22.2	60.6	0.6

### Comparisons between Pollutant Concentrations and the Daily Air Pollution Index (adopted since 2 July 2012)

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 ( $\text{mg}/\text{m}^3$ )
0	0	0	0	0	0	0
50	100	35	40	100	80	5
100	150	75	125	200	160	10
200	350	150	660	750	350	17
300	420	250	1,300	1,500	600	34
400	500	350	1,700	2,000	800	46
500	600	500	2,120	2,500	1,000	57

### Air Pollution Index

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

## 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 2020, the Environmental Protection Bureau and the Public Security Police received 13,202 complaints about ambient noise, about 47.2 percent more than the 2019 figure. The Environmental

Protection Bureau received 1,925 of these complaints, representing an increase of 42.3 percent compared with 2019; whereas the Public Security Police received the remaining 11,277 cases, a figure that was 48.1 percent more than in 2019.

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” (35.8 percent or 4,724 cases), “public areas” (35.1 percent or 4,630 cases), and “industry, commerce and services” (12.4 percent or 1,636 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.

In 2020, the DSPA finished upgrading the equipment of each monitoring station and launched the fourth flow-induced noise survey.

Apart from the monthly release of the data on these noise readings in the Environmental Geographic Information System and on the Environmental Protection Bureau’s website, the 2019 Annual Report on Data Collected by Environmental Noise Monitoring Stations of Macao was also published in March 2020.

## **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 2020, the Environmental Protection Bureau extended the water quality monitoring from the coast

to the entire 85 square kilometres of managed waters of Macao. Regarding the environmental water quality monitoring network, the Environmental Protection Bureau has set up three automatic water quality monitoring stations at Ilha Verde Dockyard, Inner Harbour and Cotai Nature Reserves. Round-the-clock monitoring of water quality is conducted through an automated network. In 2020, the Environmental Protection Bureau finished updating the equipment of each monitoring station, and continued optimising the automated water quality monitoring network.

Also, apart from the monthly release of data on the water quality readings in the Environmental Geographic Information System and on the Environmental Protection Bureau's website, the 2019 Annual Report on Data Collected by Automatic Water Quality Monitoring Stations of Macao was published in March 2020.

## **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 other water supply networks and reservoirs in the territory, to verify whether the quality complies with the requirements stipulated in the Rules and Regulations on Water Supply and Drainage in Macao (Decree-Law No. 46/96/M).

Since being awarded the ISO/IEC 17025 Certificate of Laboratory Accreditation by the China National Accreditation Committee for Laboratories (CNAL; now China National Accreditation Service for Conformity Assessment) in 2003, the Laboratory Division has enhanced its analytical performance and its quality management system. The laboratory also continued to participate in proficiency tests held by renowned organisations in mainland China and countries including the United States, the United Kingdom and Australia. The laboratory's inspection technology has fulfilled international requirements. Currently, it possesses 91 and 156 accreditations on 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, Macau International Airport Sewage Treatment Plant, and Crossborder Industrial Zone Sewage Treatment Plant – can handle 356,000 cubic metres of sewage per day.

In 2020, the Macao Peninsula Sewage Treatment Plant handled 54,486,217 cubic metres of sewage; Taipa Sewage Treatment Plant handled 9,032,396 cubic metres; Coloane Sewage Treatment Plant handled 11,906,987 cubic metres, and the Crossborder Industrial Zone Sewage Treatment Plant handled 883,097 cubic metres.

In 2020, the Environmental Protection Bureau continued to push forward with the enhancement of the Macao Peninsula Sewage Treatment Plant. The main construction of the new sewage treatment facility was completed, and the installation of electrical and mechanical equipment was underway, with the entire construction expected to be completed in the first half of 2021.

In addition, a grease trap wastewater receiving system and an odour processing system at the Coloane Sewage Treatment Plant were completed; these can improve the efficiency of treating grease trap wastewater and further minimise the impact on the surrounding environment. Also, the preliminary design and ground investigation for the in-situ enhancement of the Coloane Sewage Treatment Plant were completed. The tender documents were being prepared.

To tie in with the latest planning of the Hong Kong-Zhuhai-Macao Bridge Macao Port Management Area, after adjusting the location of the new sewage treatment plant at Macao port, the Environmental Protection Bureau started revising the preliminary design and supplementary ground investigation for the construction of the new sewage treatment plant, which would be followed by the tendering process.

In November 2020, the Environmental Protection Bureau launched an open tender for the project “Design, Construction, Operation and Maintenance of Temporary Sewage Treatment Facilities near Outer Harbour Ferry Terminal”. The work is expected to commence in the first quarter of 2021, aiming for completion and commencement of operations in the fourth quarter of 2021.

## **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. According to statistics provided by the Municipal Affairs Bureau in 2020, the CSR collected about 293,703 tonnes of household waste in Macao during the year, an average of about 803 tonnes a day.

Work continued introducing the policy of “Waste reduction at source, sorting and recycling” to implement the Macao Solid Waste Resources Management Programme (2017-2026). The Recycling Industry Equipment and Vehicles Subsidy Scheme was introduced by the Environmental Protection Bureau in 2018 to subsidise the recycling industry for purchasing certain recycling equipment, with the application deadline extended to 25 November 2021 according to Order No. 48/2020 from the Secretary for Transport and Public Works. The Subsidised Equipment Annex was also amended according to Executive Order No. 54/2020, to extend the scope of subsidies to span nearly 30 categories, with the subsidy ceiling raised from 1.5 million patacas to three million patacas.

The Municipal Affairs Bureau continued its glass bottle recycling programme. A total of 162 tonnes of waste glass were recycled during 2020. In addition, a total of 9.5 tonnes of food waste during the year; about 671.9 tonnes of used clothes were collected during the year.

During 2018, the Restaurant Food Waste Recycling Pilot Project was launched by the Environmental Protection Bureau, with a total of 90 restaurants participating by the end of 2020, recycling industrial and commercial food waste from small to medium-size restaurants through centralised treatment. After treatment, the food waste is converted to organic fertiliser to be distributed to the public and landscaping companies for free. Over 39,000 bags (100 grammes per bag) and 2,600 (20 kilogrammes per bag) of free fertiliser were distributed by the end of 2020.

The Environmental Protection Bureau again organised the “Recycling Red Packets is Easy” event during Chinese New Year in 2020, setting up more than 800 collection points across Macao.

About 510,000 red packets were collected (weighing over 1.5 tonnes). After sorting, about 230,000 red packets (weighing over 0.7 tonnes) could be distributed to the public for free in the following year for reuse, while the rest were sent for recycling.

The Environmental Protection Bureau continued organising the “Recycling Mooncake Boxes is Easy” event during Mid-Autumn Festival in 2020, setting up over 850 mooncake box collection points across Macao. During the campaign, 17,500 used mooncake boxes (weighing approximately 6,340 kilogrammes) 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 2020, the centre processed 509,026 tonnes of solid waste, of which municipal solid waste amounted to 437,592 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 2020, the incineration centre supplied 15,204 units (10,000 kWh) of electricity to the public grid.

In 2020, the Environmental Protection Bureau commenced the third-phase expansion of the incineration centre. The Government planned to build an organic resources recycling centre at the construction waste landfill, mainly using anaerobic digestion to generate biogas for electricity. The preliminary design was completed in 2020, and an open tender is expected to be carried out in 2021.

## **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 2020, the waste treatment centre processed a total of 2,730 tonnes of waste (including medical waste), with discarded tyres comprising 19 percent of the total.

In 2020, the Environmental Protection Bureau expanded the scope of Electronic and Communication Equipment Recycling Programme and launched Electronic and Electrical Equipment Recycling Programme, to facilitate the recycling of used electronic and electrical equipment from households. Apart from the 20 fixed collection points and mobile collection vehicles, the 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, providing a more convenient way of recycling. By the end of 2020, over 114,000 items of used electronic and electrical equipment were collected.

Since the Environmental Protection Bureau introduced the Used Battery Collection Scheme, over 1,280 collection points have been set up in schools, merchants, shops, residential and commercial zones, public departments, and public refuse tips in various districts of Macao. By the end of 2020, over 86,000 kilogrammes of used batteries had been collected through the scheme.

By the end of 2020, over 840 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 19,000 kilogrammes of used lamps were collected through the scheme.

By the end of 2020, a total of 110 organisations had participated in the “Recycling Glass Bottles is Easy” event. 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.

## 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 2020, about 4.06 million cubic metres of construction waste were disposed of in the landfill.

The By-law No. 22/2020 on Macao’s Construction Waste Management System, promulgated on 20 July 2020 and enacted on 17 January 2021, regulates the use and charging system of construction waste landfill, and strengthens the mechanism for monitoring and punishment of illegal disposal of construction waste, encouraging waste producers to economically reduce construction waste at source.

The Environmental Protection Bureau also conducted ground improvement work on construction waste landfills, reused selected inert construction and demolition (C&D) materials, and adopted a series of short-term measures including sediment dumping and transport from the landfills, to relieve the pressure on construction waste landfills and extend their lifespan.

## Legislation and Pollution Control

Legislation enacted in 2019 covering environmental issues included:	
1.	Amendment to Schedule of By-law No. 32/2018 on Recycling Industry Equipment and Vehicles Subsidy Scheme and the subsidy ceiling stated in Clause 1 of Article 6 (Executive Order No. 54/2020);
2.	Replacement to Standard for Acoustics as approved by Executive Order No. 248/2014 (Executive Order No. 96/2020);
3.	Replacement of Table II in Schedule of By-law No. 30/2016 on the Limit for Exhaust Gas Emissions from In-use Vehicles and Methods of Measurement as amended by Executive Order No. 130/2018 (Executive Order No. 23/2019);

Legislation enacted in 2019 covering environmental issues included:	
4.	Macao Construction Waste Management System (By-law No. 22/2020);
5	Prohibition on Import and Transhipment of Certain Goods to the MSAR, such as recycled (waste and shredded) paper or cardboard (Executive Order No. 166/2020);
6.	Approval of the form of dumping permit for the Environmental Protection Bureau in accordance with the provisions in Clause 3 of Article 7 of By-law No. 22/2020 on Construction Waste Management System (Executive Order No. 175/2020);
7.	Stipulation of disposal charges for inert, special and other construction and demolition (C&D) materials in accordance with the provisions in Clause 2 of Article 12 of Law No. 22/2020 on Construction Waste Management System (Executive Order No. 176/2020);
8.	Application deadline for Recycling Industry Equipment and Vehicles Subsidy Scheme extended to 25 November 2021 in accordance with the provisions in Article 7 of By-law No. 32/2018 on the Recycling Industry Equipment and Vehicles Subsidy Scheme (Order No. 48/2020 of the Secretary for Transport and Public Works);
9.	Prohibition on Import and Transhipment of Disposable Styrofoam Utensils to the MSAR (Executive Order No. 222/2020);
10.	Prohibition on Import, Export and Transhipment of Certain Goods listed in the Minamata Convention on Mercury, including mercury and amalgam (Executive Order No. 231/2020).

## International Treaties

Several international agreements and treaties to address global environmental problems have been made applicable to Macao, including:	
1	Vienna Convention for the Protection of the Ozone Layer; Montreal Protocol on Substances that Deplete the Ozone Layer; Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer; London Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer; Copenhagen Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer; Montreal Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer; Beijing Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer.
2	United Nations Framework Convention on Climate Change; Kyoto Protocol to the United Nations Framework Convention on Climate Change.
3	Paris Agreement

Several international agreements and treaties to address global environmental problems have been made applicable to Macao, including:

4	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (with amendments made in 1995, 1998, 2002, 2004 and 2013)
5	Stockholm Convention on Persistent Organic Pollutants (POPs) (with amendments made in 2009, 2011 and 2013)
6	Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (with amendments made in 2004, 2008, 2011, 2013, 2015, 2017 and 2019)
7	The Minamata Convention on Mercury
8	Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques
9	Plant Protection Agreement for the Asia and Pacific Region (with amendments made in 1967, 1979 and 1983)
10	International Plant Protection Convention (with amendment made in 1997)
11	Convention on Biological Diversity
12	Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (with amendments made in 1979, 1983, 2016 and 2019)
13	Protocol on Environmental Protection to the Antarctic Treaty

International treaties on maritime safety related to marine environment protection applicable to Macao include:

1	International Convention on Oil Pollution Preparedness, Response and Co-operation 1990
2	International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL)
3	Amendment to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1980
4	International Convention on Civil Liability for Bunker Oil Pollution Damage, 2001
5	Convention on the Conservation of Antarctic Marine Living Resources

## Environmental Protection and Energy Conservation Fund

The Government established the Environmental Protection and Energy Conservation Fund through By-law No. 21/2011, and established the Environmental Protection, Energy-saving Products and Equipment Subsidy Scheme through By-law No. 22/2011, aiming to subsidise enterprises and

community groups in Macao to increase their capability for protecting the environment; and to introduce environmental protection techniques and devices for further facilitating the development of environmental protection and its industry.

The Environmental Protection, Energy-saving Products and Equipment Subsidy Scheme received over 7,600 applications for subsidies during the application period. As at the end of 2020, all applications were handled, of which over 5,000 were approved, involving subsidies of more than 410 million patacas.

The Government established a scheme to subsidise equipment and vehicles for the recycling industry, according to By-law No. 32/2018 promulgated in November 2018. The application period was extended to 25 November 2021 by Order No. 48/2020 of the Secretary for Transport and Public Works; also, the Subsidised Equipment Annex was amended according to Executive Order No. 54/2020, with the subsidy ceiling raised from 1.5 million patacas to 3 million patacas. As at the end of 2020, a total of 22 applications were received. All applications were handled and approved, involving subsidies of approximately 7 million patacas.

## **Promotion of Environmental Protection Education**

With the theme “Building a Low Carbon Macao and Embracing a Green Life”, the Environmental Protection Bureau organised 521 diverse events during 2020, attended by 161,289 participants.

The by-law on Construction Waste Management System came into effect on 17 January 2021. The Environmental Protection Bureau continued to promote the regulation before its enactment. Apart from organising briefings on the regulations for construction and transport industries, associations and government departments, the bureau also worked with Macao Federation of Trade Unions to assist members in applying for dumping permits.

Executive Order on the Prohibition on the Import and Transhipment of Disposable Styrofoam Utensils to the Macao SAR came into effect on 1 January 2021. The Environmental Protection Bureau held a briefing session for the industry, to ensure the effective implementation of the measure.

Since the law on Restrictions on Using Plastic Bags came into effect, Macao communities have increased awareness of plastic reduction and developed the habit of bringing their own shopping bags. By the end of 2020, 244 related talks and law promotion activities had been held, involving more than 2,440 participants and approximately 4,960 merchants.

The Environmental Protection Bureau has actively built a platform to encourage the donation of “plastic bag fees” to environmental protection or social welfare organisations, by more than ten enterprises and businesses including six hospitality and entertainment enterprises, supermarkets, restaurants, and department stores.

Since the Green School Project was introduced in 2010, 92 schools have participated, while a series of related environmental education events and the Green Award Project have been organised. The theme for 2020 was “Reduce and Recycle Together”, with a total of 28 award-winning schools. In addition, seven schools were awarded the new Green School Platinum Award for their continued efforts in promoting environmental production in schools, while 26 teams and 38 groups were awarded the Environment Education Pedagogical Project Award and Green Campus Fun Awards,

respectively.

In 2020, the Environmental Protection Bureau organised the Macao Green Hotel Award for the thirteenth time since its inception. The number of awarding-winning hotels hit a record high, totalling 31, of which eight hotels received gold awards, five more than the previous year; 11 received silver awards; six received bronze awards, and two received merit awards, together with four budget hotels receiving awards. In all, there are now 56 award-winning hotels (as awards remain valid for three years), accounting for nearly half of all hotels in Macao. The award-winning hotels have made significant improvement in waste reduction and recycling, food waste management, and energy saving and emission reduction.

In 2019, the Environmental Protection Bureau introduced the Scheme for Recognition of Eco-Supermarkets, which includes gold, silver, bronze, and participation awards. A total of 83 supermarkets participated in the first year of the plan, with one winning the gold award, 11 winning the silver awards and 49 winning the bronze awards. The participating supermarkets were required to have promoted environmental initiatives, such as waste reduction, plastic reduction, energy saving and recycling, over the past year. By the end of 2020, a total of 118 supermarkets had participated in the scheme.

Since the launch of the Environmental Protection Fun Bonus Points Scheme, the number of members exceeded 15,000 by the end of 2020. In 2020, apart from working with community groups and estates to set up collection points, the Environmental Protection Bureau also set up Environmental Protection Fun corners and Environmental Protection Fun Clean Recycling Street Stations, and expanded the scope of materials collected by the mobile recycling vehicles. A total of 46 collection points was set up in communities. In addition, 32 plastic bottle recycling machines were set up in several stadiums, Light Rail Transit stations and border checkpoints, bringing the total of plastic bottle recycling machines to 42.

In addition, starting from November 2020, mobile recycling vehicles would provide Environmental Protection Fun recycling services in addition to the recycling of small and large appliances, computers, communication equipment, used batteries and lamps, expanding the scope of service to cover plastic bottles, aluminium/iron cans, paper, and glass bottles. The vehicles park in 16 different locations on a monthly rotating basis, to encourage recycling among the public.

In addition to the Environmental Protection Fun corners in Seac Pai Van and Bairro da Ilha Verde, the Environmental Protection Bureau set up the third Environmental Protection Fun corner in Edifício D<sup>a</sup>. Julieta Nobre de Carvalho, Toi San, with the first 24-hour recycling area (with plastic bottle recycling machines, and bins for fluorescent tubes and batteries), to provide more convenient recycling situations and environmental protection information for the local communities. Most facilities in the corner were for reused furniture and equipment.

The Environmental Protection Bureau launched the “Recycling in Buildings is Easy” programme in early 2020, to promote the installation of three-coloured bins and glass bottle recycling bins, thereby further promoting clean recycling. The programme has been well received by the community. By the end of 2020, over 780 buildings participated in the programme, and the number of participating buildings continued to grow.

Since the Environmental Protection Bureau introduced the “Reducing Plastic is Easy” event

in 2018, it has been well received. As at the end of 2020, the event had received about 810,000 customer requests for “plastic reduction” and saved an estimated 1,780,000 sets of disposable utensils. In 2020, this became an annual event.

Since the launch of “Bringing Your Own Water Bottles is Easy”, the Environmental Protection Bureau has gradually installed drinking water dispensers in Macao and government departments. By the end of 2020, 13 drinking water dispensers had been installed, saving more than 309,000 plastic bottles.

The Environmental Protection Bureau has been promoting the Scheme on Food Waste Reduction in Macao Food Festival for 11 consecutive years. Apart from making requests for the use of eco-friendly utensils and food waste recycling in food stalls, waste separation bins were also set up, and staff were assigned to help residents recycle properly. Environmental messages including reducing the use of plastic bags and disposable utensils, bringing your own reusable bags and saving food were also promoted to the public. Also, nearly 30 students, teachers and parents took part in the Enjoying Food Festivals with DSPA Mascot event, to practice reduction at source in their daily lives.

In addition, the bureau promoted environmental messages to the public during environmental festivals such as Wetland Day, Earth Day and World Environment Day, and traditional festivals such as Lunar New Year, the Mid-Autumn Festival and Christmas, and encouraged the public to participate in environmental activities and put environmental protection into practice.

## **Regional Cooperation on Environmental Protection**

Regarding environmental cooperation in the Pan-Pearl River Delta Region, the Environmental Protection Bureau attended the 16th Coordinator Working Meeting of the Joint Conference on Pan-Pearl River Delta Regional Environmental Protection Cooperation, and the 16th meeting of the Joint Conference on Pan-Pearl River Delta Regional Environmental Protection Cooperation in July and August 2020, respectively. Due to the COVID-19 pandemic, these events were held through video conferencing.

In July 2020, Guangdong, Hong Kong and Macao jointly announced the 2019 Report of the Guangdong-Hong Kong-Macao Pearl River Delta Regional Air Quality Monitoring Network. The parties will continue to manage and maintain the regional air quality monitoring network.

In addition, the bureau attended the fifth Guangdong-Hong Kong-Macao Wetland Ecological Conservation Symposium in December 2020, which facilitated connections within the Guangdong-Hong Kong-Macao Greater Bay Area and established a communication mechanism, thereby jointly protecting the wild fauna and flora in the Greater Bay Area.

Under the Framework Agreement on Cooperation Between Guangdong and Macao in Environmental Protection, the parties convened the 2020 Guangdong-Macao Environmental Protection Cooperation Task Force Meeting in December 2020, to continue deepening Guangdong-Macao cooperation in environmental protection, improving regional environment quality through joint efforts, and continue moving forward with the design and construction work for the pre-treatment site for waste and used vehicles.

Regarding Hong Kong-Macao environmental cooperation, bureau officials visited the

Environmental Protection Department of Hong Kong in January 2020. They also attended the 12th Meeting on Environmental Protection Cooperation between Hong Kong and Macao, through video conferencing, in September 2020; and attended Eco Asia Video Conference 2020 of Eco Expo Asia.

Under the framework of the Zhuhai-Macao Environmental Protection Cooperation Agreement, the Zhuhai-Macao Environmental Cooperation Working Group Meeting 2020 was held in October 2020. The two parties reviewed the environmental cooperation projects in the past year, and exchanged views on marine pollution governance, atmospheric environment quality and monitoring, communication on environmental emergencies, exchanges on ecological issues, environmental protection industry and promotion of environmental protection education. There were also discussions on plans for cooperation in the coming year.

## Environmental Protection Planning in Macao

The Environmental Protection Bureau continued implementing the long-term tasks in the Environmental Protection Plan of Macao (2010-2020) and conducted a study on concluding the implementation of the plan in 2020. At the same time, a preliminary draft of the Environmental Protection Plan of Macao (2021-2025) was prepared for formulating the environmental protection policies for the next five years.

## Environmental Data

Complaints received by the Environmental Protection Bureau in 2020:

Category	Number of cases
Noise	1,770
Air pollution	497
Noise and air	101
Noise and other	54
Air and other	43
Environmental hygiene	79
Other	114
<b>Total</b>	<b>2,658</b>

Technical advice provided at the request of other departments in 2020:

Department	Premises and projects	Nos.
Tourist Office	Premises including karaoke bars, bars, hotels, restaurants, sauna and massage establishments, dance halls and health clubs.	375
	Inspections before issuance or renewal of licences	147
Economic Services Bureau	Technical advice	23
	Inspection of industrial sites	3
	Technical advice on applications for import of HCFCs defined as controlled substances under Decree-Law No. 62/95/M	2
Lands, Public Works and Transport Bureau	Projects including piling foundations, environmental protection projects and applications for extension of construction time, construction plans, expansion plans, modification of / legalisation on construction projects	158
	Urban conditions maps	117
Municipal Affairs Bureau	Technical advice on licensed premises	292
	Site inspections	172

Moreover, the Environmental Protection Bureau provided 404 technical recommendations on environmental impact assessment areas, and received seven environmental impact assessment reports on new projects and related information in 2020.

## Flora

Macao abounds in plant species. More than 1,500 species of vascular plants have been identified in Macao. These are mainly found in woodlands, parks and leisure grounds. Most of Macao's vegetation belongs to the evergreen broad-leaf woodland, tree, shrub and coastal bush groups, including such species as Rose Myrtle (*Rhodomyrtus tomentosa*), Blood-red Melastoma (*Melastoma sanguineum*), Oblong leaved Litsea (*Litsea rotundifolia* var. *oblongifolia*), Pop-gun Seed (*Bridelia tomentosa*), Hong Kong Hawthorn (*Rhaphiolepis indica*) and Linear Forked Fern (*Dicranopteris pedata*). 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, according to research conducted until 2010 by the Civic and Municipal Affairs Bureau and researchers from the Shenzhen Fairy Lake Botanical

Garden, 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*), Golden Dewdrops (*Duranta repens* ‘variegata’), Purple Knight (*Alternanthera dentata*), *Fagraea ceilanica* and Painted Copper Leaf (*Acalypha wilkesiana*) – 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 Indian Azalea (*Rhododendron simsii*), *Cordyline fruticosa*, Small Allamanda, *Lantana montevidensis* and *Ruellia brittoniana* in recent years. The view looks more layered with the addition of these flowers, accompanied by other trees such as Golden Trumpet Trees, Terminalia mantaly, Camel’s Foot Tree (*Bauhinia variegata*) and Chinese Banyan (*Ficus microcarpa*).

## Woodland Recovery

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

In the fourth quarter of 2018, with support from the Chinese Academy of Forestry of Guangdong Province, which is directly under the Forestry Administration of Guangdong Province, the Municipal Affairs Bureau commenced the first stage of woodland recovery.

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

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

## Fauna

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

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

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

Reptiles, especially snakes, play an important ecological role in controlling the number of rats. The common Chinese Rat Snake (*Ptyas korros*), Oriental Rat Snake (*Ptyas mucosa*) and Asiatic Water Snake (*Fowlea piscator*) are non-venomous, while common venomous species include White-lipped Pit Viper (*Trimeresurus albolabris*) and Taiwan Cobra (*Naja atra*). A rare species, Many-banded Krait (*Bungarus multicinctus*), was recorded again 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 270 species of birds in 15 orders and 57 families has been recorded from 2006 to the present. Dominant species were Chinese bulbul (*Pycnonotus sinensis*, terrestrial) and Little Egret (*Egretta garzetta*, waterbirds). There were 11 common species, five of which were terrestrial birds – Spotted dove (*Spilopelia chinensis*), Swinhoe's White-eye (*Zosterops japonicus*), Crested Myna (*Acridotheres cristatellus*), Common Tailorbird (*Orthotomus sutorius*) and Eurasian Tree Sparrow (*Passer montanus*); and six species were waterbirds: Kentish Plover (*Charadrius alexandrinus*), Pied Avocet (*Recurvirostra avosetta*), Eurasian Teal (*Anas crecca*), Great Egret (*Ardea alba*), Grey Heron (*Ardea cinerea*) and Black-crowned Night Heron (*Nycticorax nycticorax*). Among common species, waterbirds outnumbered terrestrial birds.

In 2020, a total of 126 species of birds in 15 orders and 57 families were recorded in Macao, 52 of which were residents, and 74 of which were migrants. Jungle Nightjar (*Caprimulgus indicus*) and Black Baza (*Aviceda leuphotes*) were newly recorded species in 2020.

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 30 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 2019 designated part of Coloane island with an altitude of 80 metres or above as a buffer zone. Under the same law, Executive Order No. 216/2020 List of Protected Old and Valuable Trees promulgated on 16 November 2020 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;
5. By-law No. 40/2004 on Sanitary and Phytosanitary Control enacted on 14 December 2004, which regulates the sanitary and phytosanitary control of merchandise, and implements Chief Executive Order No. 245/2014 on the List of Plant Pests for Regulation as Quarantine Pest Organisms 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 December 2020, the Cotai Nature Reserve's known plant species included 268 species of planktonic algae, four species of bryophyte, 20 species of pterophyte, 11 species of gymnosperm, and 350 species of flowering plants. Regarding animal species, 142 plankton species, 133 zoobenthos species, 518 species of insects, 85 species of fish, five species of amphibians, 21 species of reptiles and 10 species of mammals were recorded. The abundant food sources attracted 186 species of birds to forage and roost in the nature reserve, including the globally rare Black-faced Spoonbill (*Platalea minor*).

To enrich education on ecology, a series of events in nature reserves were held monthly, including the Cotai Nature Reserves 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.

During the seasons with few migratory birds in 2019 and 2020, the Environmental Protection Bureau completed the tide flat enhancement work in Ecological Zone I, to improve the habitats for waterbirds, benthos, and fish. The number of migrating birds occurring in Macao has remained stable in recent years.

## **Country Parks**

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

### **Seac Pai Van Country Park**

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

### **Giant Panda Pavilion**

Set against a hill side in Seac Pai Van Park of Coloane, with a fan-shaped layout and an area of about 3,000 square metres, Macao Giant Panda Pavilion is designed to combine the terrain's natural

undulations with the architectural characteristics. The pavilion comprises two 330-square metre indoor activity quarters and a 600-square metre outdoor yard. The appearance of the Macao Giant Panda Pavilion is designed to mimic nature, and it features green elements with leisure facilities such as pools and wooden climbing frames for the pandas.

## **Taipa Grande Nature Park**

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

## **Hac Sa Reservoir Country Park**

Hac Sa Reservoir Country Park is situated in a hilly forest area on the south-eastern slopes of the central mountain of Coloane. The park occupies 377,000 square metres between the entrance of the Westin Resort Macau on Hac Sa Road to the east, and Chu Ku Tong pond, in front of Man Hong Un, to the south. The Hac Sa aquatic plant zone and aquatic plant watching zone are for nature protection and education.

## **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 81.8 hectares.

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

As work proceeded on expansion of Ka Ho Reservoir, Ka Ho Reservoir Country Park – including Ka Ho Reservoir Trail, Outdoor Experimental Camp and the Freshwater-Wetland Ecological Zone, which are managed by the Municipal Affairs Bureau – closed to the public from 17 September 2019 until completion of the project.

## Population

Macao's resident population was 683,100 at the end of 2020, representing an increase of 3,500 or 0.5 percent over the previous year. An estimated 46.8 percent of Macao's population were males, and 53.2 percent were females.

The local population was 564,100 at the end of the year, representing an increase of 9,100 or 1.6 percent over the previous year. The number of foreign employees residing in Macao declined by 6.1 percent to 102,700, while the number of foreign students residing in Macao increased by 7.2 percent to 16,300.

Natural factors are among the reasons for the increase in population. In 2020, there were 5,545 new-born babies, 7.3 percent fewer than in 2019, and 2,230 deaths, 2.3 percent fewer than in 2019. Hence, the natural population growth rate was 0.48 percent, representing a drop of 0.07 percent compared to the growth in 2019.

On top of this increase, there was a change in immigration, another factor influencing population. The net number of immigrants was 200 in 2020, representing a drop of 8,300 from 8,500 immigrants in 2019, largely attributed to 6,700 fewer foreign employees residing in Macao.

Regarding the population distribution by parish, most residents lived in Our Lady of Fatima Parish, with 264,800 residents, comprising 38.5 percent of the total population. Coloane District saw the largest rise in population, which increased by seven percent year-on-year to 32,300 residents.

## Birth and Death Rates

In 2020, the birth rate was 0.81 percent, representing a drop of 0.08 percentage points, while the death rate was 0.33 percent, 0.01 per million lower than the previous year.

## Population Ageing

Macao's population is ageing because of the increasing life expectancy. Senior citizens (aged 65 or above) made up 12.9 percent of the population, one percent more than in 2019; the number of other adults (aged 15-64) dropped by 1.1 percentage points, representing 73.8 percent of the population. The ageing index increased by 6.8 percentage points to 97.1 percent of the population over the previous year, marking the 24th consecutive year this index has increased.

The ageing in the population of Macao people is more significant, with 88,300 senior citizens (aged 65 or above), 9.3 percent more than in the previous year; the number of other adults (aged 15-64) slightly increased by 0.1 percent to 384,900. The elderly dependency ratio of the population of Macao people was 22.9 percent, which means there was one senior citizen for every five adults.

## Identification Bureau

Under the Basic Law of the Macao SAR, the Macao Special Administrative Region Government is authorised by the central government to issue MSAR Passports to Chinese citizens who hold

MSAR Permanent Resident ID cards, and to issue other types of MSAR travel permits to other legal residents of Macao. MSAR Passports and travel permits are valid for worldwide travel, and entitle their holders to return to Macao.

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

In 2020, to prevent and control the spread of COVID-19, the Identification Bureau followed the Government's pandemic prevention policies and provided services including enquiry hotlines, urgent documents and certificates handling and issuance while maintaining public departments' emergency services. In response to the pandemic, the bureau gave priority to persons with special circumstances, provided 24-hour self-service kiosks and online applications, and set up a waiting area reserved for birth registrations and fast-track processing channels.

## **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 2020, the Identification Bureau had issued 770,807 MSAR Passports and 55,696 travel permits.

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

The Identification Bureau is responsible for issuing Visit Permits for Residents of the Macao SAR to the Hong Kong SAR (also known as "Visit Permits to the HKSAR"). Residents of the MSAR who are either Chinese or Portuguese citizens and who hold a Macao Resident ID card or an MSAR Resident ID card may apply for Visit Permits to the HKSAR. The bureau had issued 448,278 such permits as at 31 December 2020.

The Identification Bureau is also responsible for issuing Macao SAR Resident ID cards. As at 31 December 2020, there were 735,672 Macao SAR Resident ID card cardholders. Between 1 January and 31 December 2020, 9,666 residents received Macao SAR Resident ID cards for the first time.

## **Nationality**

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

Between 20 December 1999 and 31 December 2020, 1,266 applications for naturalisation were approved; 557 people restored their Chinese nationality; 98 renounced their Chinese nationality; 3,457 successfully applied to adopt Chinese nationality; 72 opted for Portuguese nationality; and there were five 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 2020, the Identification Bureau issued 83,211 certificates of entitlement to right of abode.

## **Certificate of Criminal Record**

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

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

Between 1 January and 31 December 2020, the bureau issued a total of 61,380 certificates of criminal record. Of these, 44,144 were public applications, and 17,236 were agency applications. Among the 41 certificates of special record for minors that were issued, four were to public bodies,

and 37 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. The period of stay is granted according to stipulations in By-law No. 5/2003.

By 31 December 2020, citizens of 81 countries enjoyed visa-free access to Macao. Valid passport holders of these countries and regions may enter and stay in Macao for 14 to 90 days, while those from certain countries may stay for up to six months. PRC passport or travel permit holders who have a valid air ticket and visa issued by the country or region of destination may stay for a maximum of seven days in Macao.

## **Legal Immigration**

In 2020, the number of new immigrants from mainland China holding one-way permits decreased by 784 from the previous year, to 2,973, with the number of new immigrants from Guangdong province decreasing by 491 to 2,110, 66 percent of whom were female. New immigrants aged below 30 comprised 35.3 percent, representing a drop of 0.8 percentage points.

## **Overstaying and Illegal Entry**

In 2020, 10,613 overstayers were repatriated. They included 9,715 mainland China residents, 55 Taiwan (China) residents, 42 Hong Kong residents, 801 foreign nationals, and 8,675 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 5,613 registered births during 2020.

## **Marriage Registration**

The Civil Registry is responsible for handling applications for marriages, approving marriage registrations, hosting ceremonies for the signing of marriage certificates and registering marriages. A total of 2,755 marriages were registered during 2020.

## **Death Registration**

Family dependents or other relatives of a deceased person may register his or her death with the Civil Registry. There were 2,330 death registrations during 2020.

## **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 593 divorce applications during 2020.





**The new look of Luis de  
Camoës Garden**





The Luis de Camoes Garden is a popular destination for local citizens, as one of the historic gardens of Macao. To enhance its overall facilities and environment, the Municipal Affairs Bureau (IAM) launched improvement works to build more shelters and exercise equipment and to revamp the children's playground, thereby providing better sports and leisure spaces for local people.