

Chapter 14

The Environment

The Environment Bureau and the Environmental Protection Department are committed to enhancing the quality of the environment. During the year, their focus was on tackling air pollution, implementing a policy framework for managing municipal solid waste, pursuing progressive implementation of Stage 2A of the Harbour Area Treatment Scheme, promoting energy efficiency and conservation, and tackling climate change.

Hong Kong, with a paltry 1 104 square kilometres of land, is home to some 7 million people. But it is also one of the world's largest trading economies. Its steep mountains allow it only 225 square kilometres on which to put up buildings for people to live in and to work in. Strict control over urban development is, therefore, imperative. Over 400 square kilometres of the remaining land that is not built on are designated as 'protected areas'. These include country parks, special areas and conservation zones. Understandably, the heavy concentration of people and activities in a small area strains the environment, particularly the air in it. Hong Kong is also increasingly affected by air pollution in the Pearl River Delta (PRD) region.

Environmental protection is a major policy area for the Third Term of the Hong Kong Special Administrative Region Government. The policy initiative is important for the building of a quality city and a quality life for local citizens, as explained by the Chief Executive in his 2007 Policy Address. Tackling air pollution, stepping up action to improve water quality in Victoria Harbour, better managing municipal solid waste, promoting energy efficiency and strengthening further regional cooperation continue to be a government priority. Through the 'I love Hong Kong! I love green!' campaign activities, the public is encouraged to make a change in various aspects of daily living and to nurture a greener and more environmentally friendly lifestyle.

Administrative Framework

The Environmental Protection Department (EPD), under the Environment Bureau, has overall responsibility for protecting the environment, which includes nature conservation. It executes environmental policies, vets environmental planning and assessment findings, enforces and reviews environmental laws, plans and develops facilities for liquid and solid waste disposal, and promotes environmental

management, auditing and reporting. It also promotes environmental awareness in the community.

The EPD receives professional support from several government departments and advice from the Advisory Council on the Environment, which comprises 15 members appointed by the Chief Executive, including members from non-governmental environmental organisations, business groups, academic institutions and professional bodies.

The Energy Division of the Environment Bureau oversees Hong Kong's energy policy with a view to providing reliable supplies of energy at reasonable prices, promoting its economical and safe use, and at the same time minimising the environmental impact from energy usage and production.

The Sustainable Development Division, now established under the Environment Bureau, promotes sustainable development in both the Government and the community, and provides secretariat support to the Council for Sustainable Development.

Government spending on the environment in 2007-08 was budgeted at \$6.29 billion, or about 2.35 per cent of total public expenditure.

Pollution Prevention

The Government has been successful in tackling environmental problems by applying an environmental assessment process to policy planning and project proposals. Development and policy proposals submitted to the Executive Council that involve environmental issues and all submissions to the Public Works Subcommittee of the Legislative Council's Finance Committee must contain an assessment of the environmental implications.

Environmental Impact Assessment Ordinance

The Environmental Impact Assessment Ordinance provides a transparent and systematic framework for assessing the environmental impact of designated projects and for identifying effective mitigating measures if needed. It is supplemented by a technical memorandum setting out clear and consistent technical guidelines and criteria. Since the implementation of the ordinance, 113 environmental impact assessment (EIA) reports have been approved (as at December 31) and more than 1.5 million people and many ecologically sensitive areas are being protected against the effects of unacceptable environmental problems. In addition, the EPD has been promoting continuous public participation in the EIA process.

Environmental Monitoring and Auditing

The environmental monitoring and auditing process seeks to validate the assumptions made in the planning stage of development projects and monitors the effectiveness of mitigation measures to ensure every project meets the environmental performance promised in the impact assessments. In 2007, the EPD handled about 115 monitoring and auditing programmes for major projects.

For major projects, permit holders are required to set up dedicated websites to publish project information, including the results and data obtained from the environmental monitoring and auditing process. Since 2002, proponents of major projects have been required to set up web camera systems to enable the public to see conditions at their sites.

Land Use Planning

For major land use planning studies, a Strategic Environmental Assessment is required to incorporate environmental considerations into the formulation of land use plans. Under the Environmental Impact Assessment Ordinance, an EIA must be carried out as part of the engineering feasibility study of urban development or redevelopment projects with a study area of more than 20 hectares or involving a population of more than 100 000 people. These environmental assessments are an integral part of the planning studies and help identify major environmental issues and possible mitigation measures for inclusion in the land use plans.

Environmental Management and Sustainability

The new review of the Territorial Development Strategy entitled 'Hong Kong 2030: Planning Vision and Strategy', which began in September 2000, contains a strategic environmental assessment study which addresses long-term environmental sustainability issues. Members of the public took part in the study.

The Government promotes environmental management in both the public and private sectors through the Green Manager Scheme, environmental auditing, environmental management systems (EMS) and environmental performance reporting. All bureaux and departments have appointed Green Managers, most of whom have regular environmental audit programmes, and some hold ISO 14001 EMS certificates. All bureaux and departments publish annual reports of their environmental performance. Starting from 2007, all annual environmental performance reports incorporate, where appropriate, the principles of the 'Clean Air Charter' which the Government supports to improve Hong Kong's air quality.

To provide continual support to small-and-medium-sized enterprises (SMEs) to implement their EMS programmes, the EPD has produced user-friendly ISO 14001 EMS support packages for the construction and electrical/electronic sectors to follow. These packages, which are also useful to other business sectors, have been updated to meet the latest requirements outlined in the ISO 14001: 2004 version and can be freely accessed via EPD's website.

Rural Developments

The Government is committed to improving the quality of life in rural areas and to ending or removing land uses that downgrade the rural environment. The facilities for sewage disposal in the rural areas of the New Territories are also better than before and are still being improved. In 2007, the Government earmarked an additional \$2.2 billion to provide public sewers to enable domestic discharges from a further 241 000 people living in 242 villages and other areas without sewers to be conveyed to sewage treatment works.

Cross-boundary Cooperation

Because environmental pollution transcends administrative boundaries, Hong Kong and Guangdong have been working together on environmental matters for over 20 years. To strengthen this collaboration further, a Joint Working Group on Sustainable Development and Environmental Protection was set up in 2000. In December 2007, the group held its eighth meeting to review progress and to discuss the plans for 2008.

The Hong Kong Special Administrative Region (HKSAR) Government and the Guangdong Provincial Government have drawn up a Regional Air Quality Management Plan (the Management Plan) that aims to reduce pollutant emissions in the region by 20 per cent to 55 per cent by 2010, taking 1997 as the base year. Since November 2005, a regional air quality monitoring network, comprising 16 monitoring stations, has been publishing the Regional Air Quality Index. Both sides announced in January 2007 the implementation framework of an Emissions Trading Pilot Scheme for Thermal Power Plants in the PRD and completed the Mid-term Review of the Management Plan in December 2007.

Both sides also signed in August 2007 an 'Agreement on Cooperation to Promote Energy Efficiency, Cleaner Production and Comprehensive Utilisation of Resources to Enterprises in Hong Kong and Guangdong'. The purpose of the agreement is to encourage and facilitate more than 56 000 Hong Kong-owned factories in the PRD region to adopt cleaner production technologies and practices. By improving energy efficiency and reducing emission, the Hong Kong-owned factories can make a positive contribution to improving the region's air quality.

Hong Kong and Shenzhen, meanwhile, are working together on a programme to gradually reduce the water pollution loads in Deep Bay. At the end of 2007, both sides completed a review of the joint programme and agreed on further pollution load reduction and water quality improvement targets for Deep Bay. A water quality model for the Pearl River estuary, developed jointly by Hong Kong and Guangdong, was completed in mid-2007, providing both sides with a scientific tool for devising management plans and strategies to protect water quality in the estuary.

The HKSAR's Environmental Protection Department and the Shenzhen Environmental Protection Bureau signed an 'Agreement on Enhancing Cooperation on Environmental Protection between Hong Kong and Shenzhen' in December 2007 to strengthen cooperation and communication, and enhance the exchange of technology, experience and training.

Climate Change

Climate change has become one of the most important challenges to the international community. The HKSAR Government is doing its best to reduce greenhouse gas emissions by taking vigorous measures, primarily aiming at enhancing energy efficiency and promoting energy conservation to achieve sustainable development.

As a member of Asia-Pacific Economic Cooperation (APEC), Hong Kong pledged, in October 2007, to honour the commitment made in the Sydney APEC Leaders' Declaration on Climate Change, Energy Security and Clean Development and seeks to achieve a reduction in its energy intensity of at least 25 per cent by 2030 from its 2005 level. To actively participate in the global efforts, Hong Kong joined the 'C40 Large Cities Climate Leadership Group' in October 2007 to share experience with other major cities in combating climate change.

Energy Efficiency

Improving energy efficiency help address the growing concerns of climate change and local air quality. The total energy consumption at end-use level in Hong Kong in 2005 was 286 255 TJ, with residential, commercial, industrial and the transport sector consuming 19 per cent, 37 per cent, 8 per cent and 36 per cent of the energy respectively. The Energy Efficiency Office of the Electrical and Mechanical Services Department has implemented a range of programmes and initiatives to promote efficient use of energy, including implementing a number of voluntary energy efficiency registration schemes, promoting water-cooled air-conditioning systems and promoting effective energy management methods.

The Government has set an example to the community on energy efficiency. With the concerted efforts of bureaux and departments, the Government's total normalised electricity consumption in 2006-07 was reduced by around seven per cent as compared with 2002-03, equivalent to an electricity saving of 148 GWh and a carbon dioxide emission reduction of about 103 600 tonnes.

To further promote the use of energy-efficient products, the Legislative Council enacted the Energy Efficiency (Labelling of Products) Ordinance on April 30, 2008 which introduced a mandatory Energy Efficiency Labelling Scheme. The initial phase of the mandatory scheme covers room air-conditioners, refrigerating appliances and compact fluorescent lamps.

Buildings account for 89 per cent of electricity consumption. Since 1998, the Electrical and Mechanical Services Department has been operating the Hong Kong Energy Efficiency Registration Scheme for Buildings to promote voluntary compliance with the Building Energy Codes. Up to November 2007, about 800 building venues have been registered. As voluntary compliance with the Building Energy Codes appears not to be forthcoming, the Government launched a three-month public consultation on proposed mandatory implementation of the Building Energy Codes on December 28, 2007.

In 'A First Sustainable Development Strategy for Hong Kong', the Government set a target of generating one to two per cent of Hong Kong's total electricity supply from renewable sources by 2012. Meanwhile, Hong Kong's two power companies are making progress in their attempts to use clean energy to produce electricity. Hongkong Electric Company Limited started operating its wind turbine on Lamma Island in 2006. Both companies are conducting Environmental Impact Assessment studies for building off-shore commercial wind farms in Hong Kong waters.

Legislation and Pollution Control

Hong Kong has seven ordinances on pollution control. They are the Waste Disposal Ordinance, the Water Pollution Control Ordinance, the Air Pollution Control Ordinance, the Noise Control Ordinance, the Ozone Layer Protection Ordinance, the Dumping at Sea Ordinance and the Environmental Impact Assessment Ordinance. Most of them have subsidiary regulations and other statutory provisions such as technical memoranda.

The Government follows a set of environmental quality objectives to better protect public health and to preserve a natural ecosystem. The cost of imposing limits on polluting emissions is not higher than is needed to achieve conservation goals. These goals include making maximum use of the environment's natural capacity to absorb and recycle waste.

In 2007, EPD inspectors made about 50 000 visits to different places around Hong Kong to enforce controls on air, noise, waste and water pollution and to deal with complaints about pollution. This resulted in some 484 prosecutions and nearly \$4.5 million in fines.

The Stockholm Convention on Persistent Organic Pollutants (the Stockholm Convention), was officially extended to Hong Kong in July 2007, and the Hazardous Chemicals Control Ordinance was enacted in the same month to regulate the import, export, manufacture and use of non-pesticide hazardous chemicals, including those subject to the regulation of the Stockholm Convention and the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade.

The EPD also works with the construction industry, the catering industry, the vehicle repair industry, the property management sector and other trades to promote good environmental practices and compliance with pollution control regulations.

The department runs a Compliance Assistance Centre (CAC) where different businesses may obtain updated information and advice on environmental compliance, pollution prevention and environmental management.

Air Pollution

Like most modern cities, Hong Kong's air is affected by pollutants emitted from different sectors, such as transport, power generating and construction. The Government has been implementing different measures to improve air quality. Between 1990 and 2006, emissions of sulphur dioxide, nitrogen oxides (NO_x), respirable suspended particulates (RSP) and volatile organic compounds (VOC) have dropped by 32 per cent to 53 per cent.

The EPD operates a range of controls under the Air Pollution Control Ordinance (APCO) and its subsidiary regulations, including licensing of some large industrial facilities and specific controls on furnace and chimney installations, dark smoke emissions, fuel quality, open burning, dust emissions from construction works, emissions from petrol filling stations and perchloroethylene emissions from dry-

cleaning facilities. A new regulation came into effect on April 1, 2007 to limit the levels of VOC in architectural paints, printing inks and six selected consumer products, as well as to control emissions from certain printing machines.

The APCO also bans the import and sale of the more dangerous types of asbestos, namely amosite and crocidolite. Moreover, anyone intending to remove asbestos must engage registered professionals, and submit asbestos investigation reports and plans to the department.

Power plants are the largest sources of emission. To ensure smooth, timely and transparent compliance with the emission caps imposed on power plants, the Government is amending the APCO to stipulate by legislation the maximum quantity of emission permissible for the power plants and to allow them to use emissions trading as an alternative means for achieving the emission caps.

In June 2007, the Government commissioned an 18-month study to review Hong Kong's Air Quality Objectives and develop a long-term air quality management strategy, having regard to the Air Quality Guidelines recently published by the World Health Organisation and the latest international findings.

Air pollution is a cause of public concern, especially when the emission sources are near homes. In 2007, the department handled some 14 000 complaints of air pollution, of which some 7 900 were about vehicle emissions, and issued about 1 700 legal notices instructing offenders to abate air pollution.

Transport

Vehicle emissions are the major source of air pollution and nuisance experienced at roadsides. The Government's policy is to apply the most stringent motor vehicle fuel and emission standards whenever they are practicable. Between 1999 and 2007, the concentrations of RSP and NO_x, the two major air pollutants at roadsides, fell by 15 per cent and 24 per cent respectively.

Hong Kong follows the European Union's standards on emission and fuel. All newly registered vehicles are required to comply with the Euro IV standards, except for newly registered diesel private cars, which must meet emission standards that are even more stringent than the Euro IV standards. Diesel vehicles emit more NO_x than petrol vehicles, which is a major contributor to smog.

Nearly all of Hong Kong's taxis are now running on liquefied petroleum gas (LPG) and about 56 per cent of public light buses are fuelled by LPG. To control emissions from older vehicles, the Government has made the installation of emission reduction devices a statutory requirement for all pre-Euro diesel vehicles seeking renewal of their license. This regulation went into force on April 1, 2007. It has also launched two new schemes on the same day, which aim to provide incentives to encourage early replacement of pre-Euro and Euro I diesel commercial vehicles with new ones compliant with the prevailing emission standards (which is the Euro IV standards). The Government also reduced first registration tax to encourage owners of private cars as well to switch to more environmentally friendly ones.

To encourage the supply and use of Euro V diesel, which is an environmentally friendlier fuel with 80 per cent less sulphur content than ultra-low sulphur diesel, the Government is further reducing the duty rate for this fuel for a period of two years, starting from December 1, 2007.

Another motor vehicle emission control strategy is to tighten control over smoky vehicles. Under the Smoky Vehicle Control Programme, all vehicles reported must be tested for smoke levels to find out whether the owners have corrected the smoke defects. The number of smoky vehicles on roads has decreased by about 80 per cent since 1999.

Apart from having cleaner vehicles and fuels, it is essential to promote mass transit systems that are pollution-free at street level. The Government has adopted a policy that gives priority to rail over road and encourages innovation wherever practical.

Indoor Air Quality

To promote good indoor air quality (IAQ) and public awareness of its importance, the Government has introduced an IAQ Management Programme, a core element of which is a voluntary IAQ Certification Scheme for offices and public places that are served by mechanical ventilation and air-conditioning systems. It aims to recognise good IAQ management practices and to provide incentives for owners of buildings/premises or property management companies to pursue the best level of indoor air quality.

Noise

Road Traffic Noise

Under the existing policy, project proponents are required to assess traffic noise impact when planning new roads and provide necessary direct mitigation measures to abate traffic noise impacts at the noise sensitive receivers within acceptable levels. Where direct measures are inadequate, indirect noise mitigation measures must be used.

To address traffic noise from existing roads, a programme to retrofit noise barriers on noisy road sections is being carried out in phases under the Public Works Programme. About another 70 local roads will be resurfaced with low-noise material to address the traffic noise problem. This resurfacing programme is in progress and will benefit about 40 000 residential units upon completion. All high-speed (70 kilometres/hour or above) roads have been resurfaced with low-noise material wherever it was technically feasible.

To ensure that individual vehicles do not produce excessive noise, the Government tightened legislation in 2002 to require all newly registered vehicles to comply with the latest internationally recognised noise standards.

Railway Noise

Various noise reduction programmes have been implemented by railway operators since the early 1990s to address noise problems along railways. So far, noise mitigation projects have brought relief to some 110 000 residents affected by train noise. New railway projects are required to undergo environmental impact assessments to ensure their noise impact is properly addressed.

Aircraft Noise

The impact of aircraft noise on almost all residents in the vicinity of Hong Kong International Airport flight paths is within the planning standard. However, there is still concern about the aircraft noise nuisance, especially during evenings and early mornings. The Government is mindful of the concern and will continue exploring and implementing all practicable aircraft noise mitigating measures, details of which are given in Chapter 13 (Transport: section on Aircraft Noise Management).

Noise from Industrial or Commercial Activities

Noise from industrial or commercial activities is controlled through the issuance of noise abatement notices. The EPD serves abatement notices requiring the owners/occupants of premises causing excessive noise to reduce it within a given period. In 2007, the department handled about 3 300 complaints and served some 70 abatement notices, which led to some 10 prosecutions.

Construction Noise

Noise from general construction works between 7pm and 7am and on public holidays is controlled through construction noise permits. The permits restrict the use of equipment in accordance with strict criteria and ban noisy manual activities in built-up areas. Percussive piling is prohibited at night and on public holidays and requires a permit during the daytime on any day that is not a public holiday. In 2007, some 2 400 permits for general construction work and percussive piling were issued. There were about 40 prosecutions for working without permits or violating permit conditions.

The Government has phased out the use of noisy diesel, steam and pneumatic piling hammers. The law also requires hand-held percussive breakers and air compressors for construction to meet strict noise standards and to have 'green' noise emission labels. In 2007, about 400 labels were issued.

To deter repeated industrial/commercial and construction noise offences, the Noise Control Ordinance stipulates that the senior management of a body corporate will be held liable for repeated offences committed by their body corporate.

The EPD has introduced a Quality Powered Mechanical Equipment system to promote the use of more environmentally friendly construction equipment and to facilitate the application process of the construction noise permit.

Intruder Alarm and Neighbourhood Noise

The Police handles complaints about intruder alarms and neighbourhood noise from domestic premises and public places. In 2007, the police dealt with some 1 800 complaints.

Water Quality and Sewerage

Water pollution has increased with urban development and population growth, and Hong Kong now produces about 2.8 million cubic metres of sewage every day. In the past, the lack of proper treatment for most of the sewage from older urban areas around Victoria Harbour resulted in poor water quality there but, after the first stage of the Harbour Area Treatment Scheme (HATS) went into operation at the end of 2001, there has been a marked improvement. The Government is taking steps to implement the second stage of the scheme soon, to ensure that the improvement is sustained.

In addition, pollution control at source has yielded positive results, and river quality has also improved. The percentage of rivers in the 'good' and 'excellent' categories increased from 34 per cent in 1986 to 81 per cent in 2007, and the percentage in the 'bad' and 'very bad' categories fell from 45 per cent in 1986 to 10 per cent in 2007.

Sewage Treatment and Disposal

At present, the public sewerage system serves 93 per cent of the population and collects about 2.6 million cubic metres of waste water every day. About 70 per cent of the collected sewage receives chemical or higher levels of treatment before being discharged.

During the first stage of the HATS, sewage was collected from the urban areas of Kowloon, Tsuen Wan, Kwai Tsing, Tseung Kwan O and the northeastern part of Hong Kong Island and transported through a network of deep tunnels to Stonecutters Island for treatment.

The Government will implement the second stage in two phases. The first phase (HATS Stage 2A) involves extending the deep tunnel system to take the untreated sewage from the remaining parts of Hong Kong Island to the Stonecutters Island Sewage Treatment Works. The treatment plant is to be expanded to provide centralised chemical treatment for all sewage from the whole of the HATS catchment with fast-track provision of part of the disinfection facilities in 2009. The design works for the HATS Stage 2A are now well under way and the target year for completion of this phase is 2014. Under the second phase (HATS Stage 2B), new biological treatment facilities on a site adjacent to the existing Stonecutters Island Sewage Treatment Works will be built. The timing for this will be decided based on the results of a review in 2010-11 of water quality trends as well as the population and sewage flow build-up.

More details of the HATS are available on the 'A Clean Harbour for Hong Kong' website, www.cleanharbour.gov.hk.

Apart from HATS, the Government has spent a further \$15.6 billion on other sewerage schemes since 1991 and will spend another \$10 billion on schemes over the next five years. These include sewerage for rural villages. Under the Water Pollution Control (Sewerage) Regulation, the EPD is empowered to direct house owners to connect their waste water pipes to new public sewers. In 2007, public sewers were laid to serve an estimated population of 1 600 people. Since the regulation came into force at the end of 1995, public sewers have been installed to serve 146 800 people.

Sewage Charges

All water users who discharge their sewage into public sewers have to pay a basic sewage charge in accordance with the polluter-pays principle. Also, 30 trades and industries whose effluent strength exceeds that of domestic sewage, need to pay a trade effluent surcharge to reflect the additional cost of treating their stronger effluent. These charges are used to recover the operation and maintenance costs of sewage collection, treatment, and disposal facilities, while the Government provides funds for construction.

The Government's capital investment in this sector is projected to amount to about \$22 billion over the next 10 years to build HATS Stage 2A and other new sewage collection and treatment systems. In May 2007, the Government's proposals to gradually increase the sewage charge for handling domestic waste water over a 10-year time frame was approved by the legislature. This reflects the community's continued support of the polluter-pays principle and joint commitment in further enhancing the water environment. The average bill for domestic accounts would rise from \$11 per month now, to \$12 per month in 2008, and gradually to \$27 per month in 10 years' time. Even after the projected increase Hong Kong's sewage charge will remain among the lowest of the major cities of developed economies.

Livestock Waste Pollution

The Waste Disposal Ordinance bans the keeping of livestock in new towns and environmentally sensitive areas. Where they are allowed, livestock farms must have proper waste treatment systems. The Government provides a free livestock waste collection service which collected about 35 697 tonnes of waste during the year.

From a public health and environmental protection standpoint, livestock farming in urbanised Hong Kong is not sustainable in the long term. To address the problem, the Government has introduced licence-surrender schemes to encourage poultry and pig farmers to cease poultry- and pig-keeping permanently. Livestock farmers are given ex gratia payments and the schemes are entirely voluntary. The poultry and pig schemes were introduced in 2005 and 2006 respectively and farmers had up to one year to decide whether or not to join them. The two schemes have effectively decreased the number of pig and poultry farms and reduced the pollution load on the environment.

Bathing Beaches

The Government has adopted strict standards for water quality control to protect the health of swimmers at bathing beaches. These standards indicate the pollution

level measured in terms of E. coli (the bacterium that can indicate the presence of sewage). The following table shows how beaches were classified in 2007. Beaches in the 'good' and 'fair' categories meet the Government's water quality objective for bathing. In 2007, over 80 per cent of the bathing beaches met the water quality objective.

Beach water quality ranking	Bathing season geometric mean of E. coli count per 100ml of beach water	Minor health risk cases per 1 000 swimmers	Number of beaches in 2007
Good	Up to 24	Undetectable	25
Fair	25 to 180	10 or less	9
Poor	181 to 610	11 to 15	7
Very Poor	More than 610	More than 15	0

Beach water quality gradings for open beaches are available on the EPD's home page, hotline and weekly press releases.

Waste Management

Waste Reduction

The Policy Framework for the Management of Municipal Solid Waste (2005-2014), published in 2005, sets out the strategy and measures to address the municipal solid waste problem in Hong Kong over the next decade and proposes simple yet effective economic tools that will create incentives for the community to recycle more and discard less.

Waste reduction and recovery have always played an important role in waste management, resulting in the export of substantial quantities of recovered waste materials for re-manufacturing outside Hong Kong. In all, about 2.73 million tonnes of waste materials — including paper, metals and plastic — were exported in 2007, generating export earnings of about \$6 billion.

The Government is also promoting local recycling, with the development of a 20-hectare EcoPark in Tuen Mun Area 38 for exclusive use by the recycling and environmental industry. The EcoPark is being developed in two phases on eight and 12 hectares of land respectively. Lots in Phase I have been let in batches to waste recyclers since April 2007. Phase II will be commissioned in 2009.

To encourage waste reduction, recovery and recycling, the Government launched a territory-wide Source Separation of Domestic Waste Programme in January 2005, following which domestic waste requiring disposal, fell by 4 per cent in 2007, compared to 2006. On the other hand, waste from the commercial and industrial sector continued to increase, rising by 16 per cent in 2007 when compared to 2006. As a result, the Government rolled out a similar programme for the commercial and industrial sectors in October 2007.

The Government aims to implement the polluter-pays principle by introducing solid waste disposal charges and producer responsibility schemes. The Government will introduce the Product Eco-responsibility Bill into the Legislative Council to provide a legal framework for implementing producer responsibility schemes in Hong Kong. The environmental levy on plastic shopping bags will be the first statutory producer responsibility scheme under the bill. Meanwhile, EPD has reached consensus with the computer trade to organise a territory-wide, trade-funded Computer Recycling Programme, and will continue to promote the introduction of voluntary producer responsibility schemes by the other relevant trades.

Landfills

All municipal solid waste is disposed of at three large modern landfills in the New Territories, which are operated to high environmental standards.

The community disposed of about 9 430 tonnes of municipal solid waste every day in 2007. Of this, 6 370 tonnes was domestic waste and 3 060 tonnes was commercial and industrial waste. On average, each person in Hong Kong disposed of about 1.36 kilogrammes of municipal solid waste daily.

In 2007, it was estimated that the three landfills would be full in early to mid-2010s. Feasibility and environmental impact assessment studies on possible landfill extension schemes are under way.

Hong Kong has 13 old landfills, which have been restored for safety and environmental reasons. Recreational facilities have been built on three of the restored sites. Plans to develop recreational facilities on seven other sites are in progress.

Refuse Transfer Stations

Municipal solid waste is collected, delivered to refuse transfer stations by refuse collection vehicles and containerised before being taken to landfills by sea or land transport. A network of six modern transfer stations and one set of Outlying Islands Transfer Facilities handles 5 534 tonnes of waste every day. About 76 per cent of Hong Kong's domestic waste is delivered via this network to landfills.

Chemical and Special Wastes

All chemical waste producers are required to pack, label and store their chemical wastes correctly before disposal at licensed treatment facilities. A trip ticket system tracks the movement of chemical waste from its origin to the final disposal point.

In 2007, a daily average of 125 tonnes of chemical waste, including waste from sea-going vessels, was treated at the Chemical Waste Treatment Centre on Tsing Yi Island. A government contractor operates the treatment centre. Waste producers using its services are required to pay part of the treatment cost.

Following the commissioning of the Low-level Radioactive Waste Storage Facility at Siu A Chau, most of the low-level radioactive waste generated in Hong Kong has been transferred to the facility for long-term storage. The facility is purposely built to meet stringent international standards for the safe storage of low-level radioactive waste.

Clinical Waste

Upon upgrading of the Chemical Waste Treatment Centre to the latest European Union emission standards, the Government will make arrangements for the centre to receive clinical waste.

Construction Waste

The construction industry generated about 22 860 tonnes of construction waste every day in 2007. Of that, about 87 per cent was suitable for re-use. The construction waste charging scheme was introduced in December 2005 to provide an economic incentive for reducing construction waste. The Government also started, on a trial basis in mid-2007, to deliver inert materials to the Mainland for re-use in reclamation projects there.

Large-scale Waste Treatment Facilities

Hong Kong has to deal with a large volume of non-recyclable waste and needs new state-of-the-art, cost-effective facilities to treat such waste and reduce its volume. A multi-technology approach should be adopted so that wastes of different nature can be dealt with by the most suitable technology. The Government aims to commission the first phase of the large-scale Integrated Waste Management Facilities (IWMF) in the mid-2010s. The Government will also develop an Organic Waste Treatment Facilities (OWTF) that would treat source-separated organic waste such as food waste and turn them into useful resources. It plans to commission the first phase of OWTF before mid-2010s. However, even with such facilities, residual waste will still need to be disposed of at landfills.

Import and Export of Waste

Import and export of wastes are controlled by a permit system under the Waste Disposal Ordinance (WDO). The controls are in line with the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, which requires notification and consent by authorities of the states of origin, destination and transit before the shipment of hazardous or non-recyclable waste can begin.

More than 60 member states of the Basel Convention, including Mainland China, ban the export of hazardous waste from developed countries to developing countries. EPD has ceased issuing import permits for controlled waste from the banned countries since 1998. The ban arrangement was also incorporated in the WDO in April 2006.

In 2000, a memorandum of understanding (MOU) was signed between the HKSAR and the Mainland to strengthen control of hazardous waste movements between the two places. The MOU was subsequently renamed as 'Cooperation Arrangement on Control of Waste Movements Between the Mainland and HKSAR' in November 2007.

In 2007, 110 prosecutions were carried out against illegal imports and exports of waste, with fines totalling some \$2 million. Most of the offences were related to trans-shipment of hazardous electronic waste through Hong Kong to other places.

Floating Refuse in the Harbour

The Marine Department deploys a fleet of about 70 contractors' vessels to collect floating refuse and refuse from vessels. In 2007, 16 550 tonnes were collected. Besides law enforcement, the Government also uses publicity and educational activities to tackle the floating refuse problem.

Marine Dumping

Hong Kong's development projects continue to generate vast quantities of dredged mud that is unsuitable for reclamation or other uses (about 7.5 million cubic metres in 2007). It is dumped at sea in specified mud disposal areas under a permit system. Regular government monitoring is carried out to ensure that the dumping does not harm the marine environment. The EPD maintains strict control over dumping operations under the Dumping at Sea Ordinance. These operations follow the requirements of the London Convention on marine dumping.

Marine dumping permits allow operations to be carried out only by a vessel equipped with an automatic self-monitoring device to allow the authorities to trace any illegal dumping in a cost-effective manner. Moreover, the department's inspectors patrol Hong Kong's waters frequently to prevent illegal dumping.

Monitoring and Investigation

Assessing the amount of progress made in achieving policy goals is one of EPD's key activities. The results gained from its routine monitoring and special investigations form the basis for much of the department's strategic planning, provision of facilities and statutory controls. The department has 94 sampling stations in marine waters, including enclosed bays and typhoon shelters, and another 82 stations for inland waters. It also keeps 41 bathing beaches under surveillance.

The water quality monitoring programme provides a comprehensive record of the chemical, physical and microbiological quality of Hong Kong's waters. The monitoring data is shown in the annual water quality reports available on EPD's home page. The latest information on water quality of the major marine and river stations is also published on a monthly basis on the homepage. The latest water quality grades of bathing beaches are issued on a weekly basis to the media and frequently updated on the department's website.

Sustainable Development

The Council for Sustainable Development was appointed by the Chief Executive in March 2003 to promote sustainable development in Hong Kong. The council has so far addressed four key sustainability issues, namely solid waste management, renewable energy, urban living space and population policy, since launching its first public engagement exercise to consult stakeholders in 2004. In June 2007, the council launched a new round of public engagement on better air quality. It is now consolidating their views and will forward recommendations to the Government. The council has invited five rounds of applications from organisations and individuals for grants from the Sustainable Development Fund since 2003 to carry out work related

to sustainable development. Eighteen projects were approved in the first four rounds, involving grants of \$14.5 million, 12 of them have been completed so far.

One of the Sustainable Development Division's major tasks is to oversee the implementation of a sustainability assessment system adopted by the Government to facilitate the integration of sustainability considerations in the decision-making process. All bureaux and departments are required to conduct sustainability assessments of their major initiatives and programmes and to explain the sustainability implications in their submissions to the Policy Committee and Executive Council.

Government Laboratory

The Government Laboratory supports the enforcement of environmental protection legislation and the implementation of various environmental programmes through the provision of comprehensive analytical and advisory services. In 2007, it conducted numerous tests on environmental samples of air, water, sediment, soil, biota and waste, and other substances, providing useful data for various environmental programmes such as the toxic air pollutants monitoring programme, the river and marine water monitoring programmes, the biological monitoring programme, the toxic substances monitoring programme and illegal discharges investigations. The laboratory's commitment to protecting the environment is further exemplified by the round-the-clock support given to other departments in handling emergency situations such as chemical spills and suspected noxious and irritating gas leaks.

Flora

Hong Kong is situated near the northern boundary of the distribution of tropical Southeast Asian flora, sharing similar species and structure with the flora of Guangdong province. Despite its small size, Hong Kong has a rich flora with about 3 100 species of vascular plants, among which 2 100 are native to Hong Kong. Continual efforts in afforestation coupled with various conservation measures have transformed formerly bare hillsides and slopes into impressive woodlands. Besides greening and beautifying the countryside, woodlands are important habitats for wildlife and are essential to protecting water catchments from soil erosion. They also provide recreational opportunities for the public.

Remnants of the original forest cover, either scrub forest or well-developed woodlands, are still found in steep ravines or behind traditional villages in rural areas. They have survived as a result of their location in precipitous topography and the moist winter micro-climate, or because they are protected for cultural reasons.

Terrestrial Fauna

Hong Kong's climate and physical environment provide a wide range of habitats and support for a rich and varied fauna which include about 480 species of birds, 56 species of mammals, over 100 species of amphibians and reptiles, 230 species of butterflies and 110 species of dragonflies.

The Mai Po Marshes form one of the most important wildlife conservation sites in Hong Kong. Together with the Inner Deep Bay area, the Mai Po Marshes area has been listed as a 'Wetland of International Importance' under the Ramsar Convention. About 1 500 hectares of mudflats, fish ponds, marshes, reedbeds and dwarf mangroves provide a rich habitat for migratory and resident birds, particularly ducks and waders. Some 370 species of birds have been observed in this area. Many of these are considered globally threatened and endangered, such as the black-faced spoonbill, oriental stork, Nordmann's greenshank and Saunders's gull. The Agriculture, Fisheries and Conservation Department (AFCD) implements a wetland conservation and management plan to conserve the ecological value of the area.

The traditional fung shui woods near old villages and temples and the secondary forests provide important habitats for many woodland birds. Birds sighted in the wooded areas include warblers, flycatchers, robins, bulbuls and tits.

Areas around the Kowloon reservoirs are inhabited by monkeys which were released or which have escaped from captivity and their offsprings. There are breeding groups of rhesus macaques and a few long-tailed macaques, and their hybrids there. Some rhesus macaques have migrated to the forested areas of Shing Mun Reservoir and Tai Po Kau. Feeding of monkeys has been prohibited since July 1999 to prevent their growth in numbers. Other mammals such as red muntjacs, leopard cats, East Asian porcupines, Chinese ferret badgers, masked palm civets, small Indian civets, Eurasian wild pigs are quite common in the countryside. Bats such as the Himalayan leaf-nosed bats, pomona leaf-nosed bats and Chinese horseshoe bats are found in caves and water tunnels. Sightings of less common species such as Eurasian otters, small Asian mongooses and Chinese pangolins are reported occasionally.

Hong Kong has over 100 species of amphibians and reptiles. There are 24 species of amphibians, and three of them — the Hong Kong cascade frog, the Hong Kong newt and the endemic Romer's tree frog — are protected under the Wild Animals Protection Ordinance. Most of the 52 species of snakes are harmless, and reports of people being bitten by highly venomous snakes are very rare. Among the 10 native species of chelonians, the green turtle is of particular interest as it is the only known species of sea turtle that is breeding in Hong Kong.

Marine Fauna

Hong Kong's subtropical marine environment supports species of both tropical and temperate climates. Local waters contain a wide diversity of fish, crustaceans, molluscs and other marine life, of which at least 150 species are of fisheries significance.

Situated on the eastern bank of the Pearl River estuary, Hong Kong receives fresh water from the river, especially in its western waters. The waters on the eastern side, on the other hand, are little influenced by the Pearl River outflow and are predominantly oceanic in nature. This unusual hydrography helps to contribute to the diversity of marine life.

Despite being close to the northern geographic limit for the growth of hard corals, Hong Kong supports some 80 hard coral species. This diversity of corals is quite rich by international standards. A variety of marine fish also breeds in Hong Kong waters. Typical of the eastern waters is the red pargo, one of several sea bream varieties whose fry are abundant along the shore of Mirs Bay in early spring.

Two marine mammal species can be found throughout the year. The Indo-Pacific humpback dolphin, also known as the Chinese white dolphin, is the best known. The other is the finless porpoise. The humpback dolphin prefers the estuarine environment and inhabits the western waters of Hong Kong while the finless porpoise lives in the eastern and southern part, where the waters are predominantly oceanic.

To enhance inshore marine resources, the AFCD has installed artificial reefs to improve fisheries resources and biodiversity. The Marine Parks programme continues to be important for protecting and conserving sites of special ecological and conservation value.

Legislation and Nature Conservation

The Director of Agriculture, Fisheries and Conservation, who is also the Country and Marine Parks Authority, is responsible for the conservation of terrestrial and marine ecological resources and for the enforcement of legislation on nature conservation issues.

The Forests and Countryside Ordinance provides for the general protection of trees and vegetation. Its subsidiary legislation, Forestry Regulations, controls the selling and possession of certain attractive plants to deter illegal hoarding. These include native camellias, magnolias, orchids, azaleas and the Chinese New Year flower.

The Wild Animals Protection Ordinance prohibits the hunting and sale or export of protected wild animals found in Hong Kong. It also restricts entry into three important wildlife habitats that are designated as 'restricted areas'. These areas are: the Mai Po Marshes, the Yim Tso Ha Egretty and the green turtle nesting beach at Sham Wan.

The Protection of Endangered Species of Animals and Plants Ordinance imposes controls on the import, introduction from the sea, export, re-export and possession of endangered species to prevent their over-exploitation.

The Country Parks Ordinance provides for the designation, control and management of country parks and special areas for nature conservation, education and scientific research purposes. Country parks may be used for compatible recreation and tourism purposes.

The Marine Parks Ordinance provides for the designation, protection and management of marine parks and marine reserves for nature conservation, education and scientific research purposes. Recreational activities such as swimming and diving are allowed in marine parks.

The Fisheries Protection Ordinance provides for the regulation of fishing practices and the prevention of destructive fishing activities such as those involving the use of explosives or toxic substances to catch fish.

Protected Areas

There are 23 country parks and 17 special areas (six of which are located outside country parks) with a total area of 41 644 hectares (about 38 per cent of the total land area of Hong Kong) that are protected areas. They contain scenic hills, woodlands, reservoirs, islands, indented coastlines, marshes and uplands. All are carefully protected for nature conservation, education and scientific studies. Management responsibilities include the protection of woodland and vegetation against fire, control of development, tree planting, litter collection, the provision of educational and recreational facilities, and the promotion of a better understanding of the countryside.

There are four marine parks and one marine reserve covering 2 430 hectares of scenic coastal areas, seascapes and important biological habitats. Marine reserves are dedicated to conservation, education and scientific studies. Fishing in marine parks is controlled through a permit system while such activity is totally banned in marine reserves. Publicity and educational activities are organised for students and members of the public.

Besides designating the abovementioned protected areas, the Government has been identifying and conserving sites of special scientific interest (SSSI), such as areas with special geological features and natural habitats of rare plants or animals, by exercising strict land use planning and development controls. There are 66 sites listed in the SSSI register.

Topography and Geology

Hong Kong's natural terrain is characterised by rugged uplands flanked by steep slopes. The highest point is Tai Mo Shan (957 metres above Principal Datum) in the central New Territories, and the lowest point (66 metres below Principal Datum) is in Lo Chau Mun (the Beaufort Channel) to the north of Po Toi Island. The mountains are predominantly formed of volcanic rocks, whereas the lower hills are mainly formed of granite. Low-lying areas are generally underlain by granite or sedimentary rocks. A layer of soft, weathered rock covers the bedrock in most places, slope debris covers the natural hillsides, while alluvium fills many of the valleys. Offshore, the seabed is covered by marine mud, with sand sheets occurring near the coast and in channels.

The oldest exposed rocks in Hong Kong are composed of Devonian river sediments that were deposited approximately 400 million years ago. The region was subsequently inundated by a shallow sea, which deposited Carboniferous limestones, the parent material of the Yuen Long and Ma On Shan marble. Between 170 and 140 million years ago, during the Jurassic and Cretaceous periods, Hong Kong was the scene of violent volcanic activity that deposited thick accumulations of ash and lava. These eruptions were associated with the development of several calderas (giant craters). At deeper levels, molten magma intruded and slowly crystallised to form

granite. Igneous activity ceased 60 million years ago. Layered rocks now seen on Ping Chau Island are younger sediments, which settled in a lake on the edge of a desert.

During the last two million years, the Quaternary Period, several major glaciations affected the polar regions. These caused successive lowering of world sea levels of up to 120 metres, which resulted in present day Hong Kong being as far as 130 kilometres from the coast. During the interglacial periods, such as the present time, global sea level returned to its present position and marine sediments were deposited.

The geology of Hong Kong is depicted in a series of fifteen 1:20 000-scale geological maps and six accompanying geological memoirs that were produced by the Hong Kong Geological Survey unit, a part of the Geotechnical Engineering Office of the Civil Engineering and Development Department. The Hong Kong Geological Survey unit has also published two summary memoirs and a set of 1:100 000-scale geological and thematic maps that synthesise current interpretations of the geology of Hong Kong.

Energy

Gas

Towngas and liquefied petroleum gas (LPG) are the main types of fuel gas used in Hong Kong for domestic, commercial and industrial purposes. LPG is also used as a fuel by some taxis and light buses while natural gas is used for electricity generation and production of towngas.

Hong Kong has about 2.3 million gas customers in the domestic, commercial and industrial sectors. In 2007, Towngas accounted for 82 per cent of total fuel gas sold, while LPG accounted for the remaining 18 per cent.

Towngas is manufactured at plants in Tai Po and Ma Tau Kok, the former using natural gas and naphtha as dual feedstock and the latter using naphtha as feedstock. They have output capacities of 9.66 and 2.6 million cubic metres per day, respectively. Towngas is supplied through an integrated distribution system to about 1.6 million customers. The mains network extends throughout Hong Kong via a 140-kilometre high-pressure pipeline and some 3 100 kilometres of distribution mains.

LPG is imported into Hong Kong by sea and stored at five terminals on Tsing Yi Island before being distributed to approximately 690 000 customers and 58 LPG filling stations.

Natural gas is imported from the Yacheng 13-1 gas field off Hainan Island in southern China via a 780-kilometre submarine pipeline to the Black Point and Castle Peak Power Stations for electricity generation. The liquefied natural gas (LNG) terminal in Shenzhen supplies natural gas through a 93-kilometre submarine pipeline to Lamma Power Station for electricity generation. The LNG terminal also supplies natural gas through a 34-kilometre twin submarine pipeline to Tai Po plant for production of towngas.

The Gas Safety Ordinance regulates the importation, manufacture, storage, transport, supply and use of fuel gas. All gas supply companies, gas installers and contractors must be registered with the Gas Authority (the Director of Electrical and Mechanical Services).

Electricity

The Hongkong Electric Company Limited (HEC) supplies electricity to Hong Kong Island and the neighbouring islands of Ap Lei Chau and Lamma, while the CLP Power Hong Kong Limited (CLP Power) supplies Kowloon and the New Territories, including Lantau and several other outlying islands. The electricity supply to consumers is 50Hz alternating current while the voltage is 220 volts single-phase and 380 volts three-phase.

Both power companies are investor-owned. The Government monitors them through mutually agreed Scheme of Control Agreements. The current 15-year agreements with CLP Power and HEC went into effect on October 1, 1993 and January 1, 1994 respectively with interim reviews carried out every five years. The agreements require the companies to seek the Government's approval for certain aspects of their financial plans, including their projected basic tariff levels. The agreements do not give the companies any exclusive rights. They are not franchises, nor do they define a supply area for either company, or exclude newcomers to the market.

Ahead of the expiry of the current Scheme of Control Agreements in 2008, the Government conducted a two-stage public consultation in 2005 and 2006 on the 'Future Development of the Electricity Market in Hong Kong'. Taking into account the views of the public, the Government continued negotiating with the two power companies in 2007 on the new agreements which contain a number of changes to better safeguard consumers' interests. In the longer term, the Government will further open up the electricity market and will make the necessary preparations during the term of the new Scheme of Control Agreements.

Currently, HEC has a total installed capacity of 3 756 megawatts (MW) at its Lamma Power Station. The Castle Peak Power Company Limited (CAPCO) supplies electricity to CLP Power from its power stations at Black Point (2 500MW), Castle Peak (4 108MW) and Penny's Bay (300MW).

CLP Power and HEC own their respective transmission and distribution systems. The two transmission systems are interconnected by a cross-harbour link, which provides emergency back-up and some sharing of generating capacity reserve between the two systems. The link has a current total capacity of 720 megavolt-amperes (MVA).

CLP Power's transmission system is also connected to the electricity network in Guangdong Province which facilitates the export and import of electricity to and from the province. The electricity sold to Guangdong is from CLP Power's existing reserve generating capacity. Its sale is governed by an agreement with the HKSAR Government under which CLP Power's consumers are given priority of supply and 80 per cent of the profit from the sales. At the same time, CLP Power buys about 70 per

cent of the power generated by the Guangdong Nuclear Power Station at Daya Bay, which has two 984 MW pressurised water reactors, to meet part of the longer-term demand for electricity in its supply area.

CLP Power also has the right to use up to 50 per cent of the 1 200MW capacity of Phase 1 of the Guangzhou Pumped Storage Power Station, at Conghua. Off-peak period electricity from the CAPCO system and the Guangdong Nuclear Power Station is stored in the pumped storage power station, which generates hydro-electricity to meet Hong Kong's demand during peak periods.

There are regulations under the Electricity Ordinance governing the registration of electrical contractors and workers and competent persons, safety of electrical wiring, supply of safe household electrical products as well as protection of electricity supply lines from third party damage.

Climate

Hong Kong has a subtropical climate. About 80 per cent of the annual rainfall occurs between May and September. August is the wettest month while January is the driest.

November and December are generally regarded as the best months of the year with pleasant breezes, plenty of sunshine and comfortable temperatures.

January and February are cloudier, with occasional cold fronts bringing in cold northerly winds. Temperatures may drop below 10 degrees Celsius in urban areas.

March and April may be mild and pleasant but humid with occasional fog. From May to August, it is hot and humid with occasional showers and thunderstorms. Afternoon temperatures often exceed 31 degrees.

Tropical cyclones usually affect Hong Kong between June and October. The close approach of tropical cyclones could bring high winds and heavy and widespread rain. Landslips and flooding sometimes cause considerably more damage than the winds.

The Year's Weather

2007 was the fifth warmest year since Hong Kong started recording temperatures in 1884. The annual mean temperature of 23.7 degrees was 0.7 degree higher than normal. A hot spell in late July and early August necessitated the issuance of the Very Hot Weather Warning for 13 consecutive days. The year was also dry. The annual rainfall of 1 706 millimetres was about 23 per cent below the norm.

Only two tropical cyclones affected Hong Kong in 2007, much fewer than the normal six or seven.

Meteorological Services

Hong Kong Observatory

Established in 1883, the Hong Kong Observatory provides a wide range of meteorological services in weather forecasting, climatology, hydrometeorology, physical oceanography, and radiation monitoring and assessment. The observatory

also administers the official time standard for Hong Kong, provides astronomical information, monitors earthquake and operates the tsunami warning system in Hong Kong.

Weather forecast service

The observatory issues a number of forecasts and warnings to the public, which includes mariners, the aviation community as well as special users such as transport operators and container terminals:

- Weather forecasts
- Ultraviolet (UV) index
- Tropical cyclone warning
- Rainstorm warning
- Other hazardous weather warnings, such as thunderstorms, landslips, fire danger, strong monsoon, cold and very hot weather as well as frost.

Objective guidance for the issuance of rainstorm and landslip warnings is provided by a computer-based Nowcasting System developed in-house which automatically analyses radar and raingauge data and forecasts the rainfall distribution within the territory in the few hours that follow. Under the World Weather Research Programme of the World Meteorological Organisation, the system was selected as one of the very short range forecasting systems for the Beijing 2008 Olympic Games Forecast Demonstration Project. To support the 2008 Olympic equestrian event in Hong Kong, the observatory built and operates a measuring system to monitor a horse's heat stress.

The observatory's Airport Meteorological Office provides weather services at the Hong Kong International Airport (HKIA) and for the Hong Kong Flight Information Region. In 2007, it provided about 148 000 flight documents for aircraft departing from the HKIA, an increase of 4.2 per cent compared with 2006.

Weather information is disseminated through the media, the observatory's website and its automatic Dial-a-Weather System. The observatory's website continues to be one of the most popular government websites in 2007. Over 1 071 million page hits were recorded, representing an increase of about 17 per cent compared with 2006. The observatory's meteorologists also host regular TV and radio weather programmes and conduct media briefings during adverse weather.

Radiation measurement and assessment

The Environmental Radiation Monitoring Programme operated by the observatory monitors the ambient radiation levels in Hong Kong and radioactivity in air, soil, water and food. In case of a nuclear emergency, the observatory will immediately step up radiation monitoring, assess the radiological consequences and provide technical advice to the relevant policy bureaux on the appropriate protective actions to take.

Climatological service

The observatory provides climatological information to meet the needs of users and activities ranging from recreation to engineering design, environmental impact analysis and litigation. It also carries out studies on climate change and the impact of weather and climate on health. The observatory contributed to and reviewed the 4th Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) – one of the two laureates of the 2007 Nobel Peace Prize. The observatory issues annual outlooks on the rainfall and the number of tropical cyclones likely to affect Hong Kong, as well as seasonal forecasts on the temperature and the rainfall in Hong Kong.

Oceanographic service

The observatory produces an annual tide table for Hong Kong. It also provides assessments of the probabilities of occurrence of extreme storm surges and advice on oceanographic matters to other government departments and the engineering community.

Geophysical service

To monitor earthquake movements in the vicinity of Hong Kong, the observatory operates a network of eight short-period seismograph stations. Long-period seismographs at the observatory's headquarters detect tremors worldwide and information on significant tremors is made public through the media. In case of severe submarine earthquakes, a tsunami warning or bulletin, depending on the expected tsunami height, would be issued if necessary.

Official time standard

The Hong Kong Time Standard is provided by a caesium beam atomic clock, which is accurate to within fractions of a microsecond per day. The observatory contributes to the determination of Coordinated Universal Time (UTC) by supplying signals of its atomic clock to the Bureau International des Poids et Mesures (BIPM) in France. Time checking services are available to the public through the observatory's Dial-a-Weather System, the Internet and local radio stations. The Internet Network Time Service handled more than 453 million checks in 2007, a rise of 15 per cent compared with 2006.

Public education

To promote public education and awareness about hazardous weather and climate change, the observatory continues to run a programme of meteorological courses for members of the public and government personnel, exhibitions, scientific lectures, open days and guided tours of the observatory. An educational package on climate change for primary and secondary schools is also available to promote schoolchildren's awareness and understanding of the topic.

Websites

Environment Bureau: www.enb.gov.hk

Agriculture, Fisheries and Conservation Department: www.afcd.gov.hk

Environmental Protection Department: www.epd.gov.hk

Electrical and Mechanical Services Department: www.emsd.gov.hk

Sustainable Development Division: www.susdev.gov.hk

Council for Sustainable Development: www.susdev.org.hk

Hong Kong Observatory: www.hko.gov.hk and www.weather.gov.hk