



香港天文台
HONG KONG OBSERVATORY

Hong Kong Observatory

Sustainability Report for Fiscal Year 2018/19



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Chapter 1 Director's Statement

Marked by the ferocious strike of Super Typhoon Mangkhut, the year was a challenging and unforgettable one for the Hong Kong Observatory (HKO). Amidst increasing challenges arising from changing climate, advancing technology and evolving society, HKO was able to implement various measures to meet the challenges. This report details the performance and efforts of HKO in respect of sustainability in the fiscal year 2018/19.



The scenes of roaring high winds ravaging the city and huge waves smashing the shoreline brought by Mangkhut were striking to many of us. Our staff members had put every endeavour in preparation for the most destructive typhoon in decades. Tropical Cyclone standby signal No. 1 was unprecedentedly issued when Mangkhut was more than 1,000 km away from Hong Kong. Plans were deployed to assure that our operation and service could be sustained at high level so that the public could get access to our information and take precautionary measures ahead of the Super Typhoon to minimise damage. It is relieving to see no fatality was reported in the incident and restoration of the society at the wake of Mangkhut. While the experience of combating Mangkhut gave us insight into disaster risk reduction and reflection on the impact of climate changes, HKO will continue to improve its forecasting services and commit to reinforcing measures to meet the ever-increasing challenges of tropical cyclones and other extreme weather phenomena in the future.

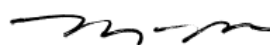
With all the unremitting effort of staff members, HKO's services were not only sustained at a high standard, but also enhanced to a more holistic extent. The launch of the Asian Aviation Meteorological Centre provides meteorological organisations in the region and the aviation sector with quality en-route weather information. Moreover, A number of notable achievements were attained recognising our effort,

including the Social Capital Builder Logo Awards 2018 commending our contribution to the development in the core social capital dimensions. All these not only served as recognition of our services to the public, but also encouraged us to continue to strive for a better and brighter future.

Apart from excellence in service development, HKO also attaches great significance to green causes. We strive to foster a green culture within our offices and also cultivate an environmentally responsible attitude among stakeholders. We put emphasis on improving indoor air quality of our working environment. The indoor air quality of buildings at HKO Headquarters (HQ) was once again categorised as “Good Class” under the Indoor Air Quality Certification Scheme, while the Terminal Doppler Weather Radar Station at Brothers Point, with its state-of-the-art greenery design, was rated as “Excellent Class”. With all our pursuit of environmentally-friendly office, we were very pleased that our green efforts had been recognised by the Environmental Campaign Committee with the award of Merits under the 2018 Hong Kong Awards for Environmental Excellence.

HKO continued to engage the public through different ways and means throughout the year, including the newly launched Facebook page and Instagram platform, annual Open Day, exhibitions, talks and lectures, to enhance interaction with the community we serve. The use of our Facebook page to issue posts and educational videos in a timely manner has proven this social media channel to be highly effective in engaging with the public so that the necessary preparations and precautions were made in advance of the close approach of Super Typhoon Mangkhut. We also launched different public competitions to raise public awareness and understanding in combat with climate change including the “1-Minute Weather” Time-lapse Video Competition. The first-ever artificial intelligence weather forecast competition in Hong Kong was also held to promote artificial intelligence and deepen youth’s knowledge about weather forecasting.

Building a better society through innovation in science and dedication in services has always been a core vision of HKO, and we shall make every effort to enhance our performance and boost sustainability in the years ahead. Readers are welcome to provide comments and feedbacks to help us identify ways for further improvement.



C M SHUN

Director of the Hong Kong Observatory

Chapter 2 About the Department

The Hong Kong Observatory (HKO), established in 1883, is a government department responsible for monitoring and forecasting weather, as well as issuing warnings on weather-related hazards. HKO also monitors and assesses radiation levels in Hong Kong, and provides other climate and geophysical services to meet the needs of the public and shipping, aviation, industrial and engineering sectors. Its governance is of international standard and is one of the leading meteorological organisations in the world.

HKO has four manned offices, with their locations as follows:

- (a) HKO Headquarters at 134A, Nathan Road, Tsim Sha Tsui;
- (b) Miramar Tower Office at Units 2304-09, 23/F, Mira Place Tower A at Tsim Sha Tsui;
- (c) King's Park Meteorological Station at Yau Ma Tei; and
- (d) Airport Meteorological Office at Chek Lap Kok.

Besides, five radar stations are operated at Tai Mo Shan, Tate's Cairn, Brothers Point, Tai Lam Chung and Siu Ho Wan. As at 31 March 2019, HKO operated a total of 195 weather stations including automatic weather stations, rain-gauges, anemometers and tide stations.



Figure 1 Brothers Point Terminal Doppler Weather Radar Station

2.1 STAFF ESTABLISHMENT

HKO had an approved establishment of 332 as at 31 March 2019, with details as shown below:

Grade	Establishment
Directorate	5
Scientific Officer Grade	67
Experimental Officer Grade	59
Radar Specialist Mechanic Grade	26
Scientific Assistant Grade	98
General Grades	54
Common Grades	23
Total	332

2.2 VISION, MISSION AND VALUES

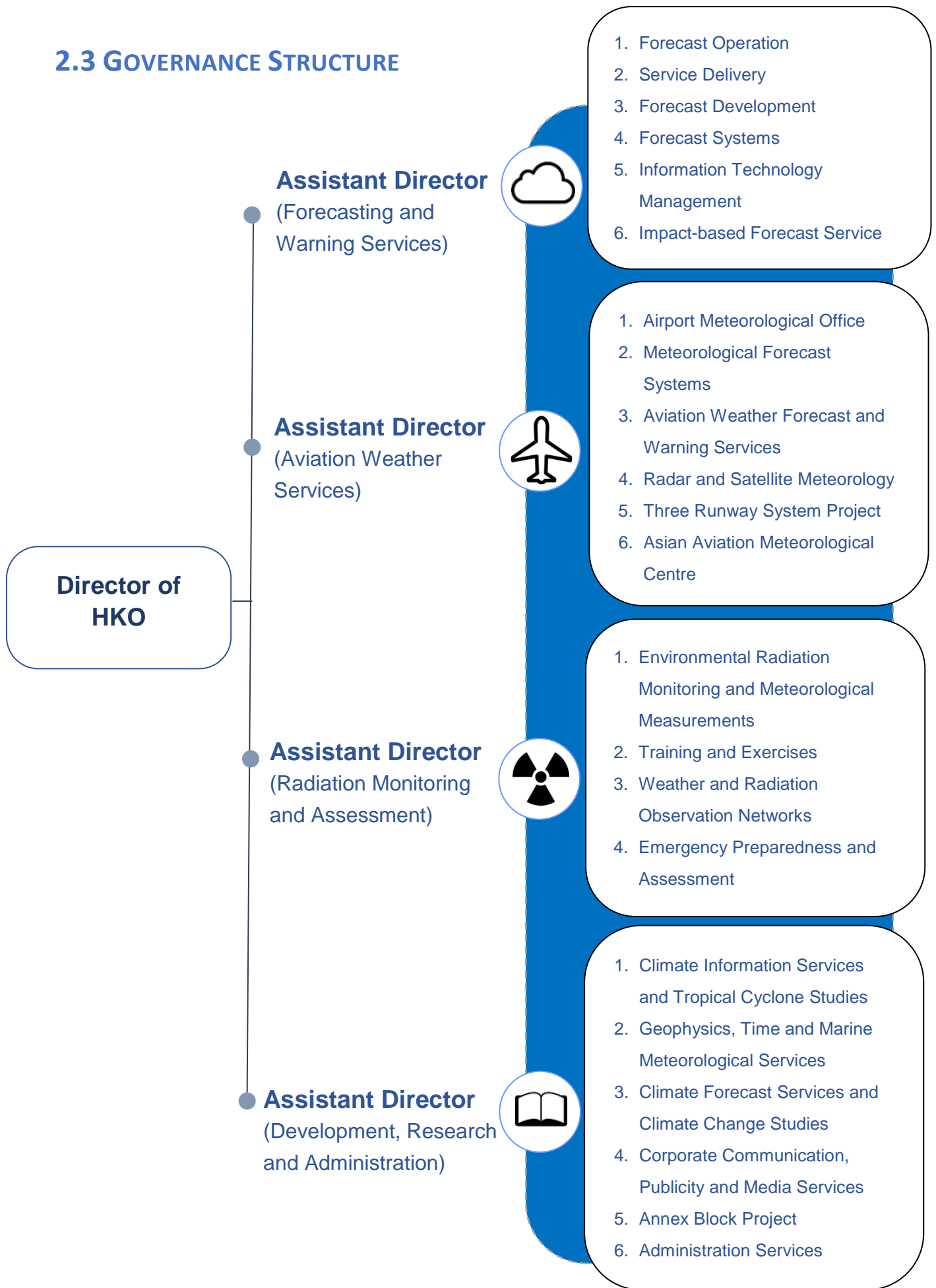
Vision: Be a model of excellence in protecting lives and building together a better society through science.

Mission: To provide people-oriented quality services in meteorology and related fields, and to enhance the society's capability in natural disaster prevention and response, through science, innovation and partnership.



Figure 2 Vision, mission and values of HKO

2.3 GOVERNANCE STRUCTURE



Chapter 3 About the Report

The Sustainability Report 2018-19 of Hong Kong Observatory (HKO) summarises our efforts and achievement to sustainable development in the past year. The report was compiled with reference to the Global Reporting Initiative (GRI) Standards, covering information on material sustainability aspects of the Observatory. The time period covered 1 April 2018 to 31 March 2019, unless otherwise specified.



This report is prepared annually to meet the needs of:

- the general public receiving HKO information via the media, telephone, mobile devices or by browsing HKO website;
- all Government Bureaux and Departments;
- visitors to HKO; and
- other users of HKO services including those from the aviation, shipping, business, industry, education, engineering, public utility and tourism sectors.

This report is divided into three main parts as follows:

- the first part (section 4) highlights the activities and initiatives of the Department during the year;
- the second part (section 5) introduces the environmental policies adopted by the Observatory and its achievement in support of sustainable development during the year; and
- the third part (section 6) presents the work done by HKO in the community, such as on the aspects of public education and communication.

Chapter 4 Activities and initiatives

4.1 5-YEAR STRATEGIC PLAN

To keep pace with an ever-changing society and increasingly challenging environment, Hong Kong Observatory has formulated a 5-year Strategic Plan that sets out directions for development thrusts for the period 2017 - 2021, with working priorities outlined as follows:

- Public weather services — to provide impact and risk-based public weather services with the Multi-Hazard Early Warning System;
- Aviation weather services — to provide excellent aviation weather services at the global and regional levels;
- Diversified climate services — to develop innovative climate services with the concept of "MET+" and support the climate change strategy of Adaptation, Resilience and Mitigation;
- Public education and communication — to enhance public engagement through new media and channels;
- Big Data — to mainstream Big Data for service development;
- Research and development — to continue research and innovation in a multitude of areas, including new instruments, high impact weather, service provision, and emergency response; and
- Resource management and training — to strengthen resource management of the department and promote diversified training.

4.2 ISO ACCREDITATION

In pursuit of quality management as advocated by the World Meteorological Organization (WMO), the HKO has been certified to the International Organization for Standardization ISO 9001 Quality Management Systems for the following areas of services, indicating international recognition of the quality management of these services.



Figure 3 ISO Accreditations of HKO on Public Weather Services (upper left), Aviation Weather Services (upper middle), Radiation and Upper-Air Meteorological Measurement Services (upper right), Ambient Gamma Radiation Monitoring Service (lower left) and Automatic Wind Measurement Services for the operation of the Tropical Cyclone Warning Services in Hong Kong (lower right)



4.3 STAFF TRAINING AND DEVELOPMENT

Training and development are vital to assurance of professional, technical and core competency in support of the long-term sustainable development of HKO towards the vision of being a model of excellence in protecting lives and building a better society through science. To this end, HKO draws up its annual Departmental Training and Development Plan and promulgates to all staff the objectives, policies, specific training and development plans and opportunities for the years ahead.

In 2018/19, HKO has provided training to staff to cope with the fast evolving global trends including the rise of social media, machine learning, Internet of Things technologies and intelligent crowdsourcing for big data analytics. Courses organised in 2018/19 are highlighted as follows:

Date	Training
8-11 May 2018	Regional Training on Strengthening Standard Operating Procedures for Tsunami Warning and the Use of the Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System Tsunami Advisory Products
23 May 2018	Crisis Communication Training Workshop for Frontline and Media Staff
16 Jul 2018	Latest Development of Urban Dispersion Modelling for Consequence Assessment of Chemical, Biological, Radiological and Nuclear Events
26 Sept 2018	Refresher course of Automatic Upper-air Sounding System
30 Oct 2018	Science informing climate change policy, risk management and outreach
2, 5 Nov 2018	Lectures on radar networks, radar meteorology of polarimetric radars, global and local measurement of rainfall
27-28 Nov 2018	Training for Social Media and Online News Monitoring Interface
25, 28 Jan 2019	Big Data Analytics, AI and Machine Learning
20 Feb 2019	Training Workshop on Media Communication

Table 1 Highlight of courses, workshops and seminars organised in 2018/19

In 2018/19, the total number of training man-days was 2,211, and the average number of training man-days per post was 6.7. The decrease, as compared with the previous year of 2017/18, was mainly because of staff's other competing commitments.

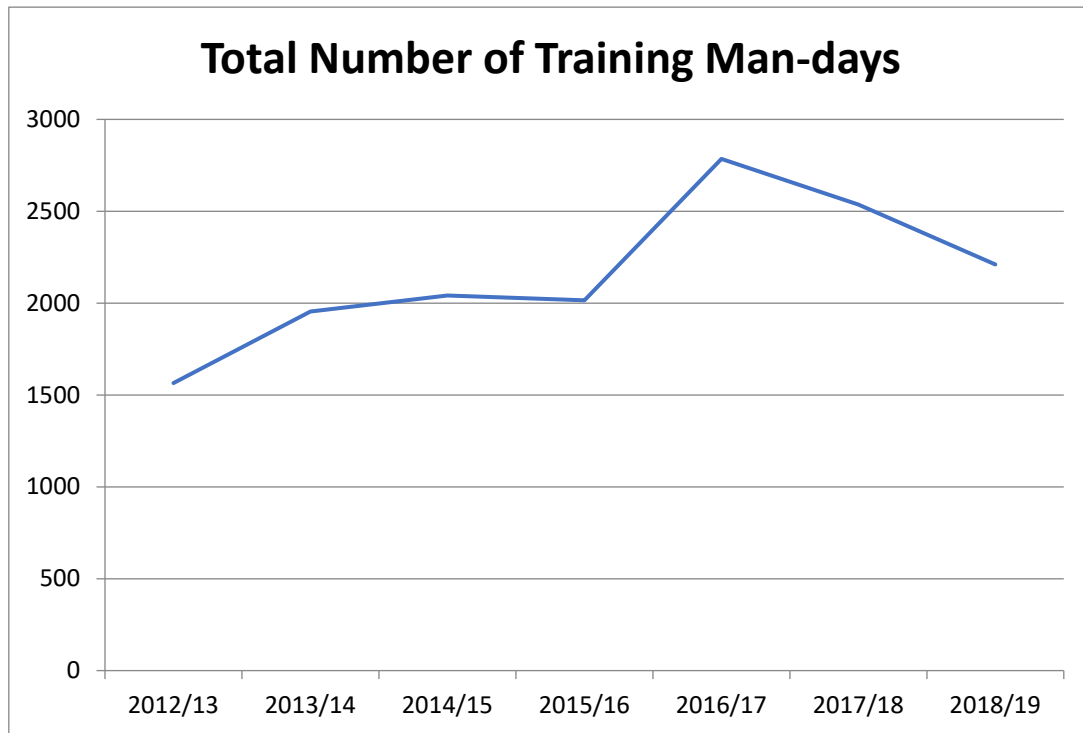


Figure 4 Total Number of Training Man-days from 2012/13 to 2018/19

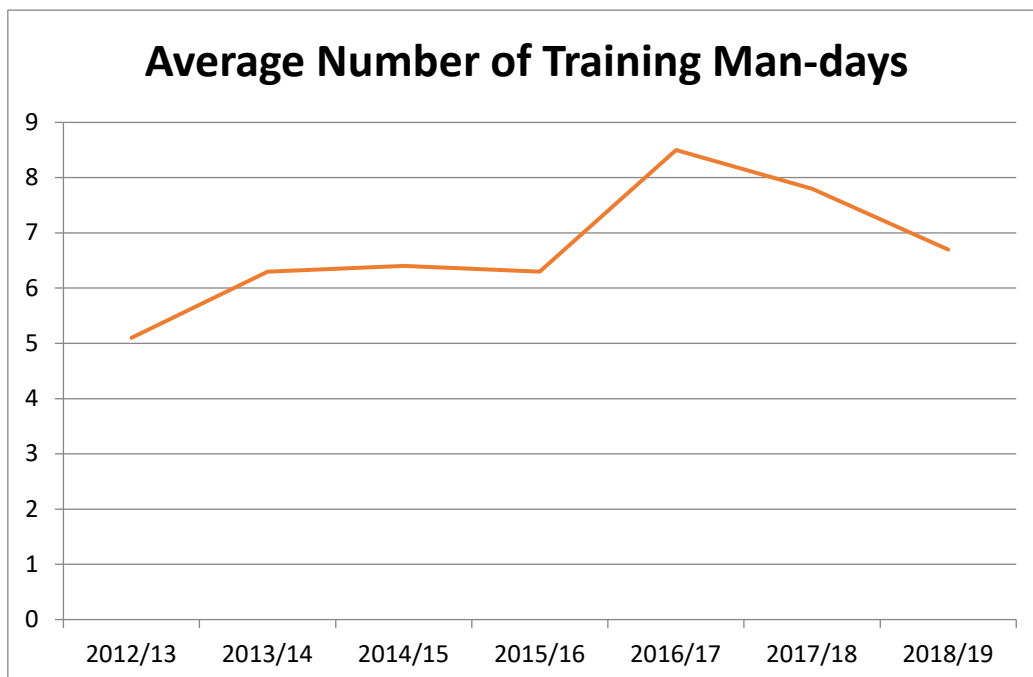


Figure 5 Average Number of Training Man-days from 2012/13 to 2018/19

A voluntary mentorship programme has also been implemented since 2014 to facilitate the transfer of skills and knowledge and to nurture a learning culture within the Observatory. The programme currently covers three technical areas, namely: (i) weather observation, (ii) information technology, and (iii) instrumentation. Staff are encouraged to join the programme as mentors or mentees according to their needs and interests.

To preserve and manage the vast amount of knowledge acquired, a number of knowledge management measures have been put in place, which include but not limit to:

- (a) a Sharing Databank to facilitate the gathering and sharing of resources and materials under different subject areas;
- (b) a revamped Cyber Learning Centre to facilitate the management of continuous self-learning by colleagues, including in-house training course materials as well as online training modules from other meteorological centres or training institutions; and

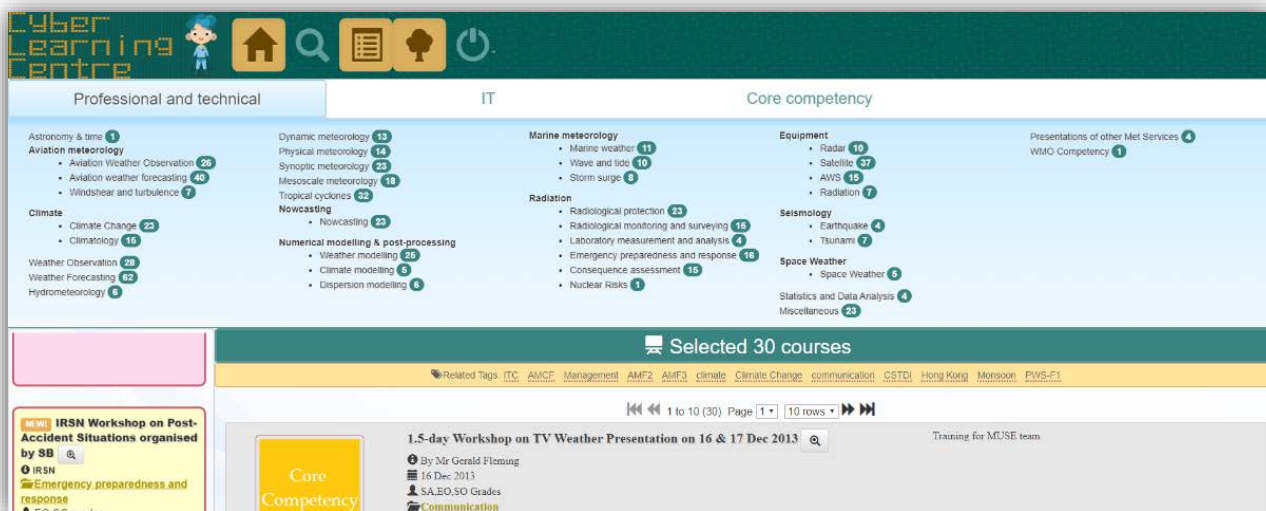


Figure 6 Cyber Learning Centre of HKO

- (c) regular Technical Forum, Weather Review Forum and Management Forum to facilitate sharing of knowledge among colleagues.

HKO's effort in staff training and development was recognised by the Employee Retraining Board and a "Manpower Developer Award" was given to us first in May 2016. We have also received again the recognition in 2018, demonstrating our commitments in five human resources areas, namely, "Leading a Learning Culture", "Resources Planning", "Training and Development System", "Performance Management", and "Corporate Social Responsibility in Manpower Development".



Figure 7 Certificate of Manpower Developer awarded to HKO

4.4 OCCUPATIONAL SAFETY AND HEALTH

HKO attaches great importance to the assurance of Occupational Safety and Health (OSH) for its staff. HKO regularly nominates staff to attend OSH courses organised by relevant Government Bureaux and Departments, such as the “General Training Course on OSH” organised by the Civil Service Bureau (CSB).

HKO also make strides in promoting OSH among civil servants by organising training courses on radiation protection. We also support the OSH Seminars organised by CSB to promote the use of general weather information as an important reference for undertaking outdoor work.

In 2018/19, HKO continued its effort to encourage staff to attend courses organised by various Bureaux and Departments, including CSB and Labour Department, e.g. “General Training Course on Occupational Safety and Health, “Occupational Stress” and “Occupational Safety Management System”. Besides, circulation of online materials on OSH was regularly made to raise staff awareness as well.



Figure 8 HKO encourages colleagues to familiarise themselves with materials on OSH

4.5 HIGHLIGHTS OF KEY INITIATIVES 2018/19

HKO is responsible for three main programme areas, namely public weather services, radiation monitoring and assessment, and time standard and geophysical services.

(A) PUBLIC WEATHER SERVICES

Weather forecast and warning services have always been our top priority. The Observatory provides weather services to the general public, fishermen, shipping community, the aviation sector, as well as other special users. Such weather services are delivered in a timely manner, providing short to medium range weather forecasts and warnings. In support of such services, it operates a range of weather monitoring equipment, including a territory-wide network of automatic weather stations for measuring wind, pressure, temperature, humidity and rainfall, a network of cameras and visibility meters for providing real-time weather photos and visibility reading, a lightning location network for detecting lightning, two long range Doppler weather radars for detecting the intensity and movement of rain areas, as well as a network of sensors and equipment in the vicinity of the Hong Kong International Airport for monitoring windshear and turbulence in support of airport operation. HKO also exchanges real-time data with other meteorological centres worldwide and receives cloud imageries from a variety of weather satellites.

Performance

In 2018/19, HKO fulfilled its performance pledge of issuing at least one bulletin every hour of the day, disseminating 99% of the bulletins within ten minutes after each hour, and attained a forecast accuracy (as verified by objective means) of 91%. The total number of page views of HKO website and mobile weather application continued to reflect the high demand from public on the weather services provided by the Observatory, reaching around 146 billion in 2018.

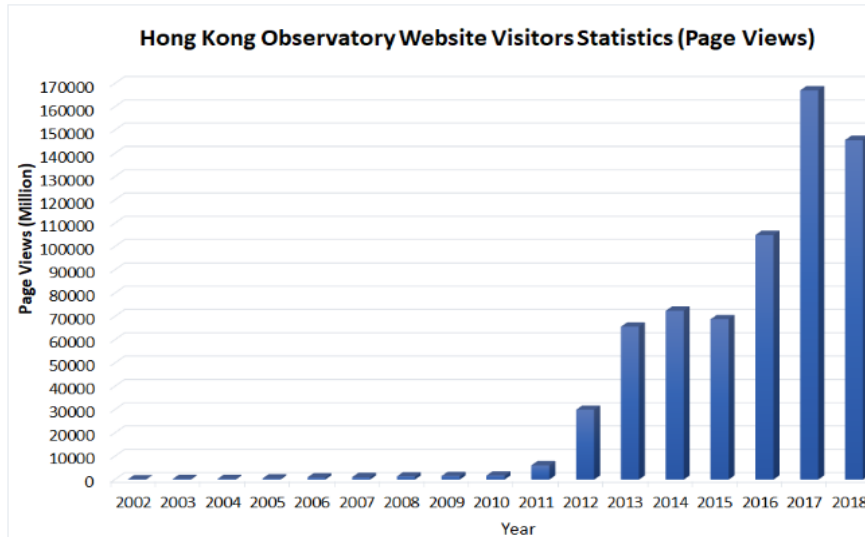


Figure 9 The total number of page views of HKO website and mobile weather application “MyObservatory” reached around 146 billion in 2018

Enhancement of international meteorological co-operation

The HKO strives to strengthen meteorological collaboration on various aspects including meteorological observations, data exchange, forecasting techniques, service delivery and training. As such, Mr. Shun Chi-ming, Director of the HKO (DHKO) signed a Memorandum of Understanding (MoU) and a Memorandum of Cooperation (MoC) respectively with the Vietnam Meteorological and Hydrological Administration (VNMHA) and the Department of Meteorology and Hydrology (DMH) of Myanmar during the Second China-ASEAN Meteorological Forum held in Nanning on 12 September 2018.



Figure 10 Mr Shun Chi-ming, DHKO (right), signed a MoU with Mr Tran Hong Thai, Acting Administrator of the VNMHA



Figure 11 Mr Shun Chi-ming, DHKO (right), signed a MOC with Dr Kyaw Moe Oo, Director General of the DMH of Myanmar

DHKO also signed a MoU on behalf of HKO with Professor Petteri Taalas, Secretary General of WMO, to further strengthen meteorological co-operation.

Under the MoU, HKO will support WMO’s initiative in establishing the Global Multi-hazard Alert System. In this connection, HKO has revamped the Severe Weather Information Centre website and is also updating the World Weather Information Service website to aggregate authoritative warning signals related to high-impact weather, water and climate events issued by official weather service organizations around the world. Members of the public and decision makers of various organizations, including international and humanitarian agencies, can make use of information on the website to keep an overview of natural disasters on a global basis and take appropriate disaster risk reduction measures.



Figure 12 Mr Shun Chi-ming, DHKO (left), signed a MoU with Professor Petteri Taalas, Secretary-General of WMO (right)

Marine meteorological services

HKO also provides marine meteorological services to international shipping, fishing and oil drilling activities in coastal waters as well as water sports activities offshore. Under the Voluntary Observing Ships' Scheme of the World Meteorological Organization (WMO), the Observatory operates a fleet of locally based voluntary weather observing ships to collect weather observations at seas for meteorological organizations worldwide. The Observatory also collaborated with shipping community to deploy drifting buoys in the South China Sea and western North Pacific to strengthen marine meteorological observation.

Aviation Weather Forecast

The Observatory's Airport Meteorological Office (AMO), which is certified to the standard of the International Organization for Standardization ISO 9001:2015 Quality Management Systems since 2002, provides meteorological services required by international air navigation to the Hong Kong International Airport (HKIA) and for the Hong Kong Flight Information Region. In particular, the Observatory operates a sophisticated network of weather sensors, including two terminal Doppler weather radars, three LIDARs (Light Detection And Ranging) systems and five weather buoys, as well as in-house developed meteorological systems for automatic alerting of windshear, turbulence, lightning and other severe weather. Extensive weather information required by the aviation community, including flight documentation for flights departing from HKIA and significant convection forecast in support of air traffic flow management, is provided through the Aviation Meteorological Information Dissemination System website and the electronic flight bag mobile weather application "MyFlightWx". AMO also provides weather briefing services to air traffic controllers regularly, which will be extended to other aviation users as well in inclement weather situations.

Launch of Asian Aviation Meteorological Centre

Jointly established by HKO, the Civil Aviation Administration of China (CAAC) and the China Meteorological Administration (CMA), The Asian Aviation Meteorological Centre (AAMC) commenced operation on 11 July 2018.

The AAMC comprises a main centre operated by the CAAC, a technical support centre operated by CMA, both in Beijing, and a backup centre operated by HKO in Hong Kong. It seeks to provide a weather monitoring platform for issuing forecasts and alerts on hazardous weather affecting aviation operation such as thunderstorms, turbulence, icing and more for reference by meteorological organisations of neighbouring

countries and regions and the aviation sector. The AAMC also provides a platform for forecasters from different areas to coordinate SIGMET contents, with a view to improving the overall forecast quality.



Figure 13 Mr Shun Chi-ming, DHKO (third right); Mr Wang Zhiqing, Deputy Administrator of the CAAC (fourth right); Mr Yu Rucong, Deputy Administrator of the CMA (fourth left); and other guests

Testbed for Doppler LIDAR designation by World Meteorological Organization (WMO)

HKO is designated by WMO as a Testbed for Doppler LIDAR systems for aviation application. HKO is the world-first in the use of LIDAR for operational windshear detection back in 2002. The LIDAR Windshear Alerting System received the Hong Kong ICT Grand Award back in 2009. Currently seven Doppler LIDARs, consisting of two long-range and five short-range LIDARs, are installed at HKIA for detection of windshear, building wake and wake turbulence from aircraft. The designation by WMO as a Testbed for Doppler LIDAR for aviation application is a further recognition from the meteorological community of HKO's technological advancement in the use of Doppler LIDAR to gain better knowledge on windshear and turbulence which is critical for aviation safety.



Figure 14 The long-range Doppler LIDAR (left) and short-range Doppler LIDARs (right) at HKIA

(B) RADIATION MONITORING AND ASSESSMENT

HKO provides information on local environmental radiation levels and effects and advises the Government on counter-measures that may be necessary during nuclear emergencies. It monitors ambient radiation levels in Hong Kong and conducts radiological measurements on samples of air, soil, water and food. Its radiation measurement services are certified to the standard of ISO 9001:2015 Quality Management Systems.

In the unlikely event of a nuclear emergency at the nuclear power stations in Guangdong, HKO will immediately step up radiation monitoring, assess radiological consequences and provide technical advice to the government regarding appropriate protective actions to take.

In 2018/19, all radiation monitoring and assessment work in this programme was carried out satisfactorily. All equipment was maintained in a state of readiness, highlighted by the successful annual surveillance audits under ISO 9001:2015 for radiation laboratory and ambient gamma radiation level measurement service.

Exercises, drills and training on radiation monitoring and assessment were conducted successfully. New radiation monitoring equipment, enhanced communication facilities and a new computer system for nuclear accident consequence assessment were implemented for enhancing emergency preparedness and response capability.



Figure 15 Radiological Protection Officers' Course organised by HKO in late 2018

(C) TIME STANDARD, GEOPHYSICAL AND CLIMATOLOGICAL SERVICES

HKO maintains time standard, provides time signals for the public and contributes to the International Bureau of Weights and Measures for determination of the universal standard time. It monitors earthquakes and sea level, and releases related information to the public, including operation of tsunami warning system. It provides geophysical, oceanographic, astronomical and climatological information to meet the requirements for town planning, engineering design and environmental impact assessments. It also keeps abreast of research and development on international issues such as global climate change and advises the public and government departments on likely implications.

HKO continued to devote its efforts in raising public awareness on the adverse impact of climate change. Other means of public education, including school talks and educational videos, was pursued to convey the importance of taking actions to combat climate change.



Figure 16 Short video production "Cold Met Stuff" introducing climate issue



Figure 17 Colleague of HKO receiving certificate of appreciation from the organiser of "Build4Asia Conference 2018: Climate Change Problems and Sustainable Solutions"

Chapter 5 Environmental Management

5.1 ENVIRONMENTAL POLICY

Hong Kong Observatory has put in place a departmental environmental policy that meets the guidelines issued by Environmental Protection Department and other government departments, such as the Electrical and Mechanical Services Department and Architectural Services Department. Our Sustainability Policy covers environmental, workplace well-being, health and safety, and community engagement issues. Moreover, we are committed to the Clean Air Charter, which aims at making sustained improvement to air quality by introducing clean and energy-efficient measures in daily operation; and the Green Bottle Charter, which seeks to minimise use of plastic bottles within the department. We strive to improve the environment by:

- conserving bio-diversity and preserving natural habitat within HKO HQ and its outstations;
- developing a culture of environmental conservation among staff;
- adopting the best practices in green housekeeping;
- complying with requirements of relevant environmental protection ordinances; and
- promoting public awareness of environmental issues.

Figure 18 HKO was awarded the Certificate of Merit under the 2018 Hong Kong Awards for Environmental Excellence in recognition of its continual and dedicated efforts in protecting the environment.



5.2 GREEN MANAGEMENT SYSTEM

HKO has set up the following committees/working groups to formulate, monitor and implement environmental policy at HKO:

Working Group on Energy and Environment

The Working Group on Energy and Environment, established in 2006, aims to collect and implement green ideas from staff and promote green awareness among all levels in HKO. It is chaired by Assistant Director (Development, Research and Administration), with staff from different grades/ranks as members.

Samples on new measures and staff suggestions were implemented during 2018/19:

- reducing provision of air conditioning during non-working hours at Miramar Tower Office
- deployment of more air-purifiers in workplace

Buildings, Grounds and Accommodation Committee

The Buildings, Grounds and Accommodation Committee, chaired by Assistant Director (Development, Research and Administration), evaluates the utilisation of space and all major civil and building services works carried out at HKO premises and grounds to minimise the impact on the environment. Members include Departmental Secretary, who is also the Green Manager of HKO, and four Senior Scientific Officers from their respective branches.

5.3 ENVIRONMENT MEASURES

HKO has adopted multi-pronged environmental measures to support and implement the Government’s green initiatives and promote low carbon living style and energy conservation awareness among staff.

(a) Car Free Day 2018

To reduce carbon emission from vehicles, staff are encouraged to use environmentally-friendly means to travel to work. In this regard, a Car Free Policy is adopted at HKO to encourage colleagues to designate at least one working day per week as a Car Free Day.

In 2018/19, we also supported the initiative by Friends of the Earth and designated 22 September 2018 as our departmental “Car Free Day 2018”.

(b) No Air Con Night 2018

The increasing use of air-conditioners is widely regarded as one of the culprits behind global warming and climate change. To help alleviate global warming and promote energy conservation, HKO participated in the “No Air Con Night 2018” organised by Green Sense and suspended the use of non-critical air-conditioners for one night on 5 October 2018.



Figure 19 Mr SHUN Chi-ming, DHKO (fifth right of the first row) attended the opening ceremony of No Air Con Night 2018

(c) “Planting Day”

HKO organised the annual Planting Day on 29 April 2018. Around 30-strong HKO colleagues and their family members joined the event and participated in the planting of seedlings.



Figure 20 HKO Planting Day 2018

(d) Waste Check Charter

HKO continued to participate in the Waste Check Charter, organised by Environmental Protection Department and Hong Kong Productivity Council, in 2018-19.

During the Charter period, HKO honoured its pledge to submit data on waste disposal and waste recovery regularly. We continued to put our effort in upholding waste reduction in workplace.



Figure 21 Certificate of HKO joining Waste Check Charter since 2015

(e) Preservation of bio-diversity



Figure 22 Lawn outside 1883 Building of HKO HQ



Figure 23 Mini-forest at HKO Headquarters

Apart from its historical and operational values, the woodland at HKO HQ also serves as a natural shelter for local birds. It is one of the few remaining semi-natural woodlands in Kowloon. Avian species like Spotted Dove, Chinese Bulbul, Crested Bulbul, Magpie Robin, Black-necked Starling and White-eye are inhabitants of HKO woodland. The woodland is also of utmost importance as it serves as a stopover for migrating birds. Some birds, including Brown Flycatcher, Blackbird and Grey-backed Thrush, even stay for the whole winter.



Figure 24 Black-necked Starling resting on the lawn of HKO HQ

HKO cherishes the bio-diversity of its site and works hard to preserve the natural habitat of trees and vegetation at HKO HQ. Expert consultants / contractors are commissioned to help monitor and upkeep healthy condition of the plants. Some 500-strong trees of different species can be found within the HKO compound with details as shown below:

	English Name	Chinese Name	Scientific Name
1	Lebbek Tree	大葉合歡	<i>Albizia lebeck</i> (L.) Benth.
2	Alexandra Palm	假檳榔	<i>Archontophoenix alexandrae</i> (F. Muell.)
3	Hong Kong Orchid Tree	洋紫荊	<i>Bauhinia x blakeana</i> Dunn
4	Camel Foot Tree	宮粉羊蹄甲	<i>Bauhinia variegata</i> L.
5	Tall Bottle-brush	串錢柳	<i>Callistemon viminalis</i> G. Don
6	Horsetail Tree	木麻黃	<i>Casuarina equisetifolia</i> L.
7	Yellow Cow Wood	黃牛木	<i>Cratoxylum cochinchinense</i> (Lour.) Blume
8	Flame Tree	鳳凰木	<i>Delonix regia</i> (Boj. ex Hook.) Raf.
9	Longan	龍眼	<i>Dimocarpus longan</i> Lour.
10	Lemon-scented Gum	檸檬桉	<i>Eucalyptus citriodora</i> Hook. f.
11	Chinese Banyan	細葉榕	<i>Ficus microcarpa</i> L. f.
12	Common Red-stem	青果榕	<i>Ficus variegata</i> var. <i>chlorocarpa</i> (Benth.) King
13	Big-leaved Fig	大葉榕	<i>Ficus virens</i> var. <i>sublanceolata</i> (Miq.) Corner
14	Pond Spice	潺槁	<i>Litsea glutinosa</i>
15	White Champak	白蘭	<i>Michelia alba</i>
16	Chinese Red Pine	馬尾松(山松)	<i>Pinus massoniana</i> Lamb.
17	Frangipani	雞蛋花	<i>Plumeria rubra</i> L.
18	Buddhist Pine, Kusamaki	羅漢松	<i>Podocarpus macrophyllus</i> (Thunb.) D. Don
19	Wood-oil Tree	木油樹	<i>Vernicia montana</i> Lour.
20	Candlenut	石栗	<i>Aleurites molucanna</i>
21	Indonesian Cinnamon	陰香	<i>Cinnamomum burmannii</i>

5.4 SUMMARY OF OTHER GREEN MEASURES

(i) Paper Consumption

- ✓ Adopting duplex printing practices, minimising photocopying, and uploading the “Guidelines on Reducing Photocopying Paper Use” onto the intranet for reference.
- ✓ Using blank side of used papers for drafting, printing, photocopy and fax documents.
- ✓ Encouraging staff to re-use envelopes and file jackets whenever possible.
- ✓ Replacing printing of newsletters and circulars by electronic means and uploading publications on HKO website.
- ✓ Establishing a policy of 10% cut in the stock supply of A3 and A4 papers and reducing the consumption of A3 paper for printing weather charts.
- ✓ Encouraging the use of electronic means, such as email and e-Memo, for external and internal communication.
- ✓ Encouraging paperless meetings.

(ii) Waste Reduction and Recovery

- ✓ Recycling as the preferred option for disposal.
- ✓ Setting up shared printers to reduce the purchases of printers and toner cartridges.
- ✓ Collecting empty toners and inkjet cartridges of computer printers for recycling.
- ✓ Encouraging staff to use re-usable stationery such as refillable ball pens.
- ✓ Paper wastes, plastic bottles and aluminum cans to be collected separately at source by recycle bins.

(iii) Energy Conservation

- ✓ Using clean energy, such as solar power or wind power, to support operation of automatic weather stations and radiation monitoring stations.



Figure 25 Bollard lamps at HKO HQ using solar power



Figure 26 Automatic weather station at Lai Chi Kok Park using solar power (see arrow)

- ✓ Using automatic circuit-break timers to switch off unnecessary electrical appliances after office hours.
- ✓ Using energy-saving T5 fluorescent tubes in all HKO premises to reduce energy consumption and installing motion sensors to reduce energy wastage.
- ✓ Segregating hot and cold air flow by setting plastic screens in high-performance computer room to enhance cooling efficiency of air-conditioning system.
- ✓ Using auto-sensitised water taps in washrooms to reduce water consumption with flow controllers installed to reduce wastage.
- ✓ Minimising the number of servicing lifts after normal office hours.
- ✓ Encouraging staff to use staircases instead of lifts for inter-floor traffic.
- ✓ Conducting regular inspection to ensure that lights, computers and other electrical appliances in offices, conference rooms, corridors and common facilities are switched off during lunch breaks and after office hours.
- ✓ Switching off lights, air conditioners, photocopiers, computers and other electrical appliances when not in use.
- ✓ Using solar powered lighting devices.
- ✓ Setting the ambient office temperature to 25.5°C in summer months and switching off air-conditioning system in winter, wherever and whenever appropriate, by using electronic control panel.
- ✓ Encouraging staff to dress more casually to reduce air-conditioning consumption where appropriate.
- ✓ Conducting regular checks and maintenance on air-conditioning systems.
- ✓ Installing solar films in departmental vehicles and security guard rooms.

(iv) Air Quality Improvement

- ✓ Joining IAQ Certification Scheme with “Good” class awarded in 2018 for 1883 Building and Centenary Building at HKO HQ, and “Excellent” class awarded for Brothers Point Terminal Doppler Weather Radar Station.



Figure 27 IAQ Certificate Scheme "Excellent" class label for Brothers Point Terminal Doppler Weather Radar Station

- ✓ Conducting regular indoor air quality checks, and carrying out regular cleaning and repairing for air-conditioning systems.
- ✓ Maintaining a non-smoking environment in office premises and, designated area aside, prohibiting smoking at outdoor areas of HKO HQ.

(v) Procurement Practices

- ✓ Complying with the government's regulations and guidelines regarding green procurement.
- ✓ Encouraging suppliers to provide HKO with environmentally friendly products and stipulating green procurement specifications in tender documents, wherever appropriate.
- ✓ Implementing e-Procurement system in phases to reduce the use of papers when conducting supplies and procurement activities.
- ✓ Utilising environmentally friendly products, such as:
 - Photocopiers and printers capable of double-side and eco-printing
 - Automatic sensor installed in water dispensers
 - Water-saving type flush cisterns
 - High efficiency water purifiers
 - High pressure water gun for car-washing
 - High efficiency electrical appliances

(vi) Promoting Staff Awareness

- ✓ Promoting the principle of "Reduce, Reuse, Recycle and Replace" and encouraging staff to practice this 4-R principle in daily work where applicable.
- ✓ Promulgating resource saving tips regularly via emails, staff notices, circulars and posters.
- ✓ Organising staff activities, such as Car-free Days and Light-off Days, to enhance environmental awareness.
- ✓ Operating an internal website "Green Corner" to enhance colleagues' awareness on energy consumption, with guidelines on energy, paper and water conservation posted, as well as tips for energy saving at home and in office.
- ✓ Engaging staff in recycling programmes such as recycling of books, moon cake boxes and red packets.

5.5 ENVIRONMENTAL TARGET AND PERFORMANCE

HKO aims to achieve the following specific targets in 2018/19:

- 2.5% reduction in envelope consumption compared to 2013/14
- 2.5% reduction in paper consumption compared to 2013/14
- To continue to reduce annual electricity consumption with a target to achieve 5% saving by 2019/20 when compared with 2013/14 ¹
- To continue implementing green initiatives and other measures for conservation of bio-diversity.

(A) ENVELOPE CONSUMPTION



Target 2.5% reduction achieved

With the concerted effort of HKO staff, the annual cumulative envelope consumption for 2018/19 was 2,463 pieces, significantly reduced by 1384 pcs (i.e. 36%), when compared with the figure in the base year 2013/14. The target of reducing envelope consumption by 2.5% was therefore well achieved.

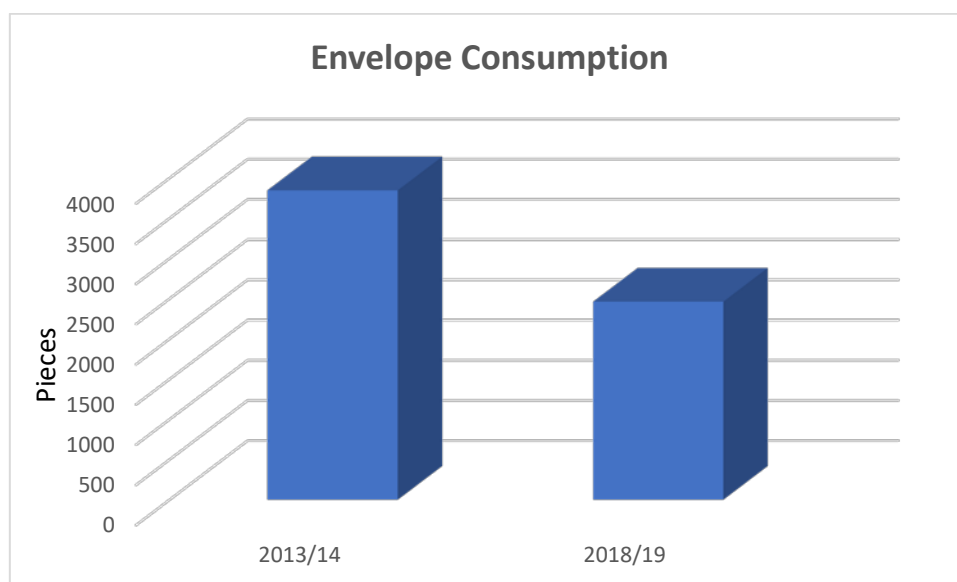


Figure 28 Envelope consumption in 2013/14 and 2018/19.

¹ The 2015 Policy Address has set a target of 5% saving in the total electricity consumption of government buildings from FY 2015/16 to FY 2019/20 under comparable operating conditions, using FY 2013/14 as the baseline.

(B) PAPER CONSUMPTION



Target 2.5% reduction achieved

As a result of various measures adopted, the annual cumulative paper consumption for 2018/19 was 1,458 reams, reduced by 52 reams (i.e. 3.4%), as compared with the baseline figure in 2013/14. The target of reducing paper consumption by 2.5% was therefore achieved as well.

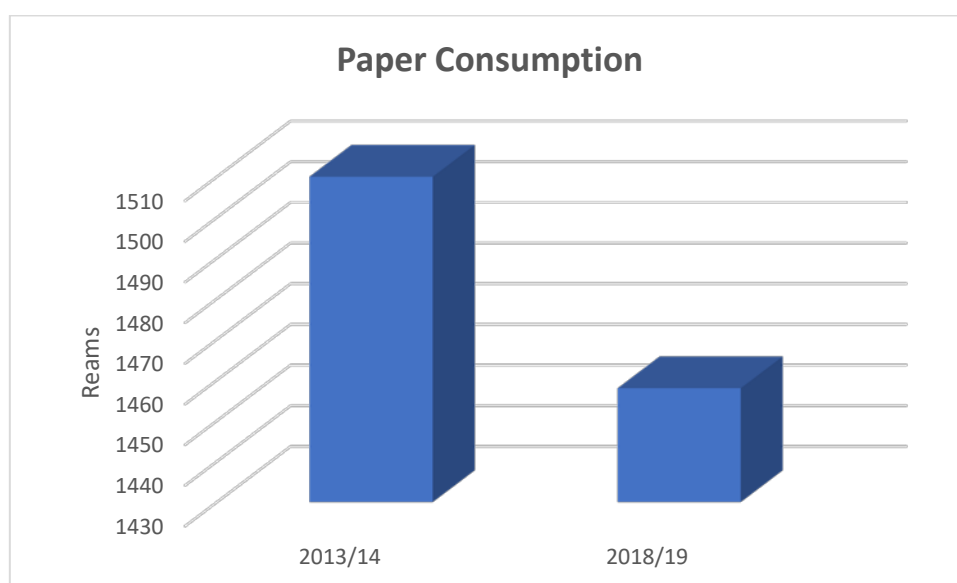


Figure 29 Paper consumption in 2013/14 and 2018/19

(C) ELECTRICITY CONSUMPTION



Target 5% reduction achieved

The annual cumulative electricity consumption for 2018/19, after normalised against activity changes in the intervening years, was 3,950,171 units, a decrease of 6% as compared with the base year 2013/14. HKO will keep up its effort to continue to achieve the target of 5% in 2019/20.

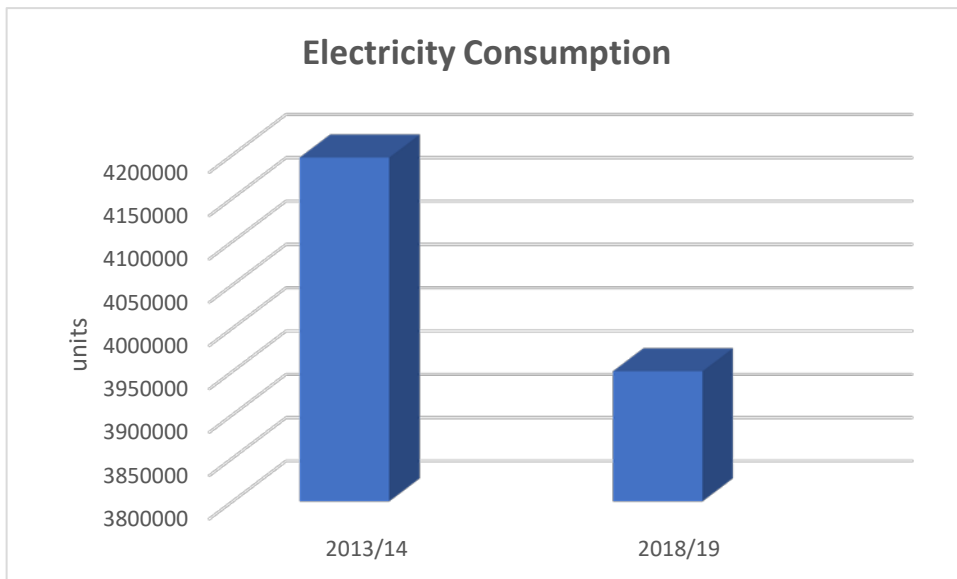


Figure 30 Electricity Consumption in 2013/14 and 2018/19, after normalized against activity changes

(D) CARBON AUDIT

In line with prevailing international and local practices, HKO has started to report its carbon audit results starting from 2016/17. The scope of carbon audit covers:

- Fuel consumption by departmental vehicles
- Electricity consumption at HKO HQ, King's Park Meteorological Station, Miramar Tower Office and outstations
- Greenery at HKO HQ
- Paper consumption
- Freshwater processing
- Sewage processing

The carbon emission of HKO in 2018/19 was 2,366.48 tonnes of CO₂-equivalent, which has slightly increased by 1.36% when compared with that of 2017/18 mainly due to the increased number of staff. In fact, the carbon emission per employee of HKO has decreased by 4.78% when compared with that of last year.

Carbon Audit Report Table						
Description (by source, areas, etc.)	GHG Emission by gas type (in tonnes of CO ₂ -equivalent)					
	Carbon Dioxide (CO ₂)	Methane (CH ₄)	Nitrous Oxide (N ₂ O)	Hydrofluoro-carbons (HFCs)	Perfluoro-Carbon (PFCs)	Total
Scope 1 Direct GHG Emissions						
Mobile Combustion Sources						
	49.23	0.0947	5.5973	N/A	N/A	54.93
Scope 1 GHG Emissions Total:						54.93
Scope 1 Direct GHG Removals						
Planting of Additional trees						
	N/A	N/A	N/A	N/A	N/A	0
Total Scope 1 GHG Removals:						0
Scope 2 Energy Indirect GHG Emissions (without being classified into specific gas type)						
Electricity Purchased:						2,288.68
Towngas Purchased:						N/A
Total Scope 2 GHG Emissions:						2,288.68
Scope 3 Other Indirect GHG Emissions						
Methane Generation at Landfill due to Disposal of Paper Waste						
	16.64	N/A	N/A	N/A	N/A	1,617.49
Electricity for Processing Fresh Water (without being classified into specific gas type)						3.49
Electricity for Processing Sewage (without being classified into specific gas type)						1.89
Total Scope 3 GHG Emissions						22.88
Total GHG Emissions of 2018/19:						2,366.48
Total GHG Emissions of Previous Year 2017/18:						2,334.73
% Change in GHG Emissions compared with Previous Year						+1.36%
GHG Emissions per employee of 2018/19						7.17
GHG Emissions per employee of Previous Year 2017/18						7.53
% Change in GHG Emissions per employee compared with Previous Year						- 4.78%

Table 2 Carbon Audit Report Table of FY 2018/19

Chapter 6 Engagement with the Community

6.1 OUTREACH ACTIVITIES

(A) HKO OPEN DAY 2019

An Open Day event is organised at HKO HQ in Tsim Sha Tsui for the public annually, in which information on climate change and other meteorological knowledge is shown through various displays and exhibits.

HKO Open Day 2019 was held on 23 and 24 March with nearly 12,000 visitors attending the event. More than 90 volunteers from "Friends of the Observatory" served as goodwill ambassadors and offered enthusiastic support and assistance in receiving the visitors.

HKO also organised "Talk on Extreme Weather" (the Talk) on the World Meteorological Day on 23 March. The Talk attracted around 600 members of the public, including uniform and underprivileged groups. It aims at weather cross-overring with art to bring out the messages of disaster preparedness and climate change.



Figure 31 HKO Open Day 2019



Figure 32 Group photo of talk on extreme weather, with Mr Shun Chi-ming, DHKO (7th from left of the front row) photographing with well-known local singer Mr Albert Au (8th from left of the front row)

(B) CO-ORGANIZATION OF FIRST AI WEATHER FORECAST COMPETITION

The “AI Challenge – Weather Forecast Competition” jointly organised by HKO, Hong Kong Meteorological Society, Hong Kong Education City and Microsoft (HK) Limited was the first time ever of a similar competition in Hong Kong. It was very well-received and altogether 33 teams from 24 secondary schools participated.

HKO provided about 6 million entries of data from 14 selected automatic weather stations of the past 10 years for use, namely hourly air temperature, relative humidity, wind direction and wind speed, as well as rainfall amount. Students were required to make use of machine learning methods to forecast hourly air temperature at Zero Carbon Building in Kowloon Bay for five consecutive afternoons and nights in late November. They also needed to submit a video and a presentation file to elaborate rationales behind their model design. Adjudicators gave scores based on forecast accuracy, application of machine learning, mathematical analysis and computational thinking, as well as team collaboration and communication, and then came up with the winners and 7 merits.

Participating team members and teachers indicated that the competition had deepened their knowledge about weather forecasting.



Figure 33 Group photo with guests of the award presentation ceremony and winning teams

(C) PUBLIC TALKS, LECTURES AND EXHIBITION

HKO continues its efforts to play an active role in promoting public awareness on various issues including weather forecasting and climate change. Talks, school visits, seminars and lectures are organised in order to achieve this goal.

(i) The 13th Edition of Eco Expo Asia

The 13th Eco Expo Asia, organised by Hong Kong Trade Development Council and co-organised by Environment Bureau, was held at AsiaWorld-Expo, Hong Kong from 25 to 28 October 2018 with the theme of "Waste Less Save More for a Low-carbon Future". HKO participated in the exhibition and presented evidence and impacts of climate change, calling for actions in the aspects of mitigation, adaptation and resilience to combat climate change. HKO also delivered a climate change talk titled "Hong Kong in a Warming World" at Public Day Forum to enhance public awareness on climate change issues.



Figure 34 Mr WONG Kam-sing, Secretary for the Environment (second right), Mr Donald TONG (1st right), Permanent Secretary for the Environment and Director of Environmental Protection, and Mr Benjamin CHAU, Deputy Executive Director of the Hong Kong Trade Development Council (first left), visited the booth of the Observatory

(ii) Partnering with Water Supplies Department in Climate Change Talk

To enhance students' awareness on climate change and understanding of adaptation measures, HKO and Water Supplies Department jointly delivered a climate change talk for about 200 students and teachers at Shau Kei Wan East Government Secondary School on 25 October 2018. The talk covered topics on scientific basis and impacts of climate change, impacts on water resources under climate change, strategy of water resource management and promotion of water conservation.



Figure 35 Climate Change Talk at Shau Kei Wan East Government School

(iii) “Cloud-sourcing: In Touch with Weather from Land, Sea and Air” Photo and Video Exhibition

The “Cloud-sourcing: In Touch with Weather from Land, Sea and Air” Photo and Video Collection Campaign held between 14 December 2017 and 13 February 2018 received enthusiastic support and participation from aviation and marine communities. More than 2,000 weather images and over 100 videos taken from land, ships and aircraft were collected. With support of the Airport Authority, shortlisted entries were displayed at the terminal of the Hong Kong International Airport from 3 July to 11 November 2018.

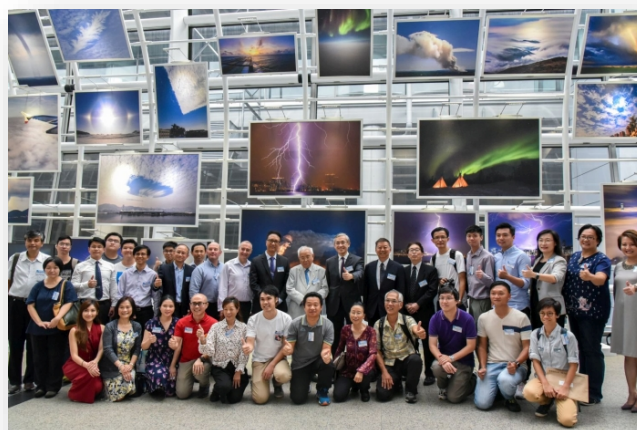


Figure 36 Guests and award winners in front of the “Cloud-sourcing: In Touch with Weather from Land, Sea and Air” Photo and Video Exhibition

(C) OTHER OUTREACHING ACTIVITIES

(i) Guided Tours in HKO HQ

Guided tours are held regularly through which members of the public can visit HKO HQ in Tsim Sha Tsui. Apart from understanding how weather forecasts are formulated and how technology is applied in delivery of HKO services, participants can also learn more about the historical development of HKO and ecological values of the woodland of HKO at the heart of urban area.



Figure 37 Guided tour for students of the Hong Kong Shue Yan University on 29 March 2018.

(ii) 2nd “Sky of Silver Age” Weather Photo and Time-lapse Video Competition

Jointly organised by HKO and Senior Citizen Home Safety Association, the event successfully completed in May 2018. The competition received overwhelming responses, with more than 200 excellent entries from senior citizens. Most of the entries fully and vividly conveyed the theme of the competition, “Winds and Clouds over Hong Kong”.



Figure 38 Winner of the Master Group of the second "Sky of Silver Age" Weather Photo and Time-lapse Video Competition

(iii) Encouraging the Youth to Innovate



“The Ultraviolet Radiation Measurement and Application Design Competition” has come to an end with great success. The objectives of the competition are to enhance knowledge of and interest in science, engineering and information technology among the young generation, as well as to encourage practice of innovation technology and creative design. Students' work has fully displayed their innovative ideas and also demonstrated their perseverance and team spirit.

Figure 39 Students of the Primary School Category champion team, PLK Women's Welfare Club Western District Fung Lee Pui Yiu Primary School, introducing their design

(iv) Voluntary and Charity Activities

The HKO Volunteer Team is established to support and participate in various voluntary and charity activities. In the year of 2018/19, the volunteer team organised a series of activities including fund raisings and visits to help the needy in the community and enhance mutual understanding between different parties of the society.



Figure 40 Voluntary service event - "5.20 Love at the Observatory"

Figure 41 Child and volunteer took photos together at the Observatory studio during "5.20 Love at the Observatory"



Figure 42 Mr Shun Chi-ming, DHKO (second left) learnt balloon twisting techniques from "balloon master" Mr Andy Liu (first right) during "5.20 Love at the Observatory"

Figure 43 The volunteer team visited Chan Ping Memorial Neighbourhood Elderly Centre in July 2018



HKO's effort in engaging the community has been recognised by the Community Investment and Inclusion Fund of Labour and Welfare Bureau with Social Capital Builder Logo Awards 2018. The Awards aim to commend organizations for their contribution to development in six core social capital dimensions, including "Social Networks", "Mutual-help and Reciprocity", "Trust and Solidarity", "Social Participation", "Social Cohesion and Inclusion" and "Information and Communication".



Figure 44 Social Capital Builder Logo Award 2018

6.2 STAFF ACTIVITIES

Staff morale and well-being are indispensable keys to better governance and service provision. HKO continues to develop initiatives to maintain and enhance mutual understanding and support between management and staff, including activities organised under the “Happy Business” programme.



Figure 45 Poster of “Happy Business” Programme of HKO

A number of visits and activities were organised in 2018/19:

- a visit to the Happy Valley Underground Stormwater Storage Scheme on 6 April 2018;
- a visit to HKO Waglan Island Automatic Weather Station on 26 July 2018; and
- a visit to the Hong Kong News Expo on 21 February 2019.



Figure 46 A visit to the Hong Kong News Expo on 21 February 2019



Figure 47 A visit to Waglan Island Automatic Weather Station on 26 July 2018

Apart from the “Happy Business” programme, HKO also strives to enhance the wellness and cohesiveness of staff through various means, including:

- Departmental Consultative Committee Meetings to serve as a platform to discuss staff related issues;
- tea gatherings between senior management and staff were organised regularly to enhance communication and mutual understanding;



Figure 48 Tea gathering between senior management and staff in October 2018

- the HKO Staff Association with activities fostering work relations and a spirit of mutual assistance among members; and



Figure 49 Annual staff dinner organised by Staff Association in April 2019 celebrating 135th Anniversary of HKO



Figure 50 HKO Staff Association participated in and won the “Running Oi Man 2018” fund raising event

- “Sky Dragon”, HKO’s dragon boat team formed in 2015, participated in various dragon boat races.



Figure 51 “Sky Dragon” at the Kwun Tong Promenade Dragon Boat Festival in 2018.

Chapter 7 Verification Statement

I have verified the information and data of the Sustainability Report 2018/19. I confirm that the data presented in the Sustainability Report 2018/19 are authentic and the methodology for the collection and analysis of data is appropriate. The report represents an accurate account of HKO's sustainability actions and performance in the fiscal year of 2018/19.



Jerry Siu
Green Manager
Hong Kong Observatory

Chapter 8 Feedback form

This report is available on our homepage at the following link:

http://www.hko.gov.hk/environmental/Sustainability_Report_1819_eng.pdf and
at our Resource Centre at the following address:

Units 2304-2309, 23rd floor, Mira Place Tower A,
132 Nathan Road, Tsim Sha Tsui, Kowloon
Tel.: 2926 8250

If you wish to obtain further information or raise any suggestions about this report, please contact our Green Manager at telephone 2926 8227 or email to dsec@hko.gov.hk. You can also make use of the following feedback form and send it back to the Green Manager, Hong Kong Observatory, 134A, Nathan Road, Tsim Sha Tsui, Kowloon, Hong Kong, or fax it to 2311 9448, or by email to dsec@hko.gov.hk.

To Green Manager, Hong Kong Observatory

Feedback Form on HKO Sustainability Report 2018/19

1. Do you find the Report informative? Yes No

2. Do you find the content of the Report easy to understand? Yes No

3. What other sustainability issues you would like HKO to include in the Report?

4. Which aspects of the Report need to be improved?

5. What is your overall view of the Report?

Name:

Telephone:

Email: