Water Conservation

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Foreword

The notion of water sustainability underpins the key messages that we want to convey to the readers through the Water Resources Information Portal. In order to help spotlight the significance of achieving water sustainability goals in our city, we would need to refer to, briefly, two inter-connected conceptual-cum-policy frameworks that are perched, respectively, at the global and the national levels.

The essence of the global agenda on water sustainability has been crystallized in Sustainable Development Goal #6 (SDG #6). Asides from highlighting the centrality of ensuring access to clean water and sanitation for all, the multiple sub-goals of SDG #6 remind us that managing the world's water resources in a sustainable manner will yield substantial cross-sectoral benefits. Conserving water at the city and the country scale, through policy measures and behavioural changes, could help protect global biodiversity as well as mitigate greenhouse gases emissions' impact on the global climate system.

The country's national agenda on water sustainability, on the other hand, has been articulated in the 14th Five-Year Plan for Water Security, promulgated in 2021 by the National Development and Reform Commission (NDRC). One of the NDRC Plan's guiding principles accords a higher degree of preference to demand management measures (i.e., water conservation) than the conventional supply augmentation approach. The NDRC Plan also, for instance, prioritizes, for municipal water managers' attention, the reduction of water losses emanating from the water supply networks under their charge. Moreover, in line with the spirit and the letter of the national goal of building an ecological civilization, the Plan accentuates the importance of incorporating the safeguarding of freshwater biodiversity into sustainable water resources management practices at the national, provincial and municipal scale.

Translating the aforementioned goals of the global and national agendas on water sustainability into impactful local actions is a challenging task. The difficulty stems from a relatively low degree of water literacy detected among the general public. Water literacy goes beyond people's knowledge of water issues; it also entails their attitudes toward water conservation ethics and their ability to appreciate and enact meaningful changes in their own water usage behaviour. Early empirical evidence, however, suggests that the mastery of water literacy amongst our community's diverse social groups is wanting. Against this backdrop, the Water Resources Information Portal has thus been created by the Centre for Water Technology and Policy to help nurture a water-literate community in our city.

Our efforts in assembling the Information Portal are guided by one fundamental belief: Embracing a river basin-oriented perspective is essential for us to comprehend the challenges in, and opportunities for, managing water resources sustainably in the 21st century. Through imparting individuals with essential water knowledge and encouraging them to consider water resources management matters from a river basin angle, we aim at broadening our community's collective understanding and sharpening their vision for managing water resources in a sustainable manner. This approach, fully aligned with the global and national water sustainability agendas, aspires to foster an active participation of Hong Kong people from all walks of life in the global water stewardship project.

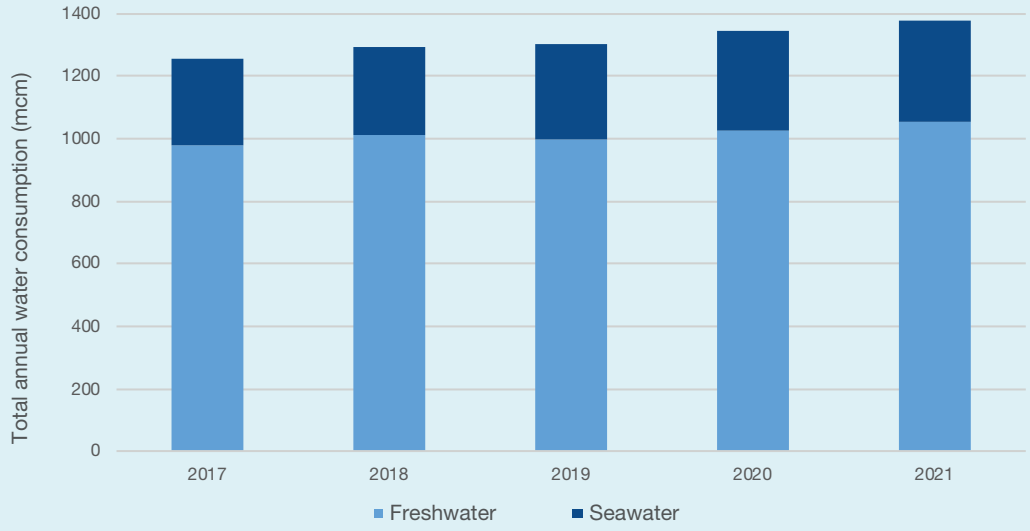
1. Water consumption

Hong Kong's water demand is met by freshwater and seawater. For instance, in 2021, freshwater resources, comprising local yield and imported Dongjiang water, constituted 77% of the city's overall water supply. The remaining 23% was sourced from seawater.

1.1 How much water does Hong Kong consume annually?

According to the Water Supplies Department's Annual Report 2021-22, total annual water consumption in Hong Kong was recorded at 1,376 million cubic meters (mcm). This figure includes 1,055 mcm of freshwater and 321 mcm of seawater.

The amount of freshwater consumed is equivalent to filling up 422,000 Olympic-sized swimming pools.

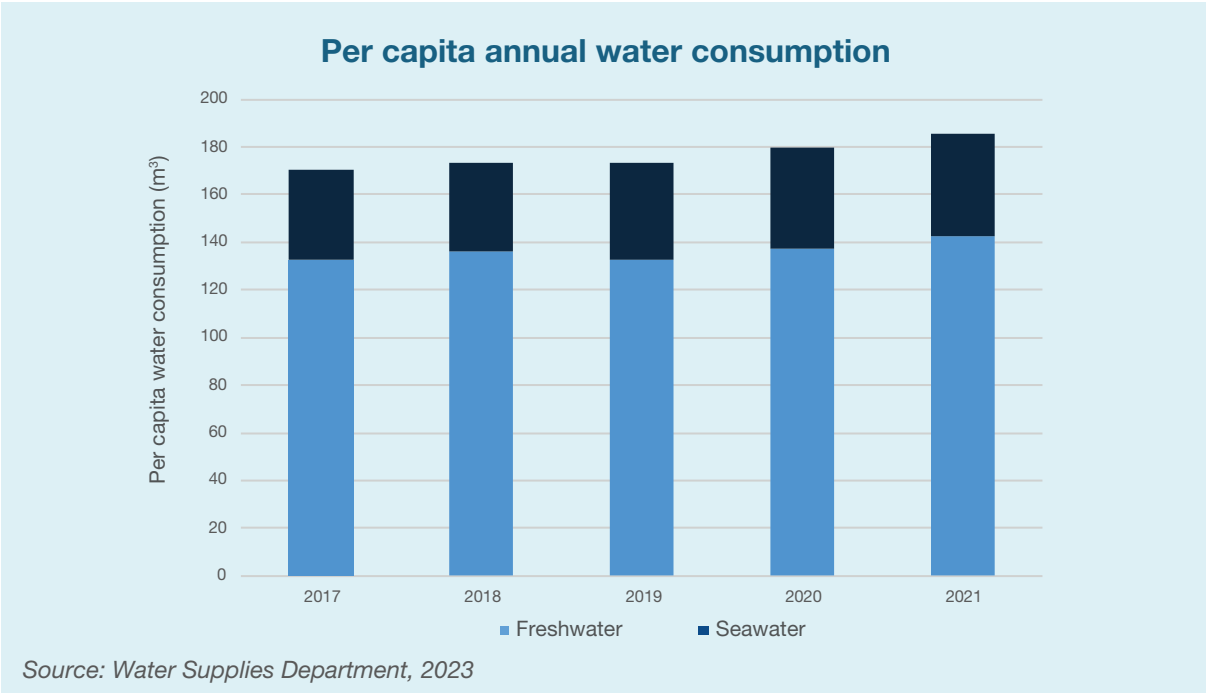


Source: Water Supplies Department, 2023

1.2 How much water does each person use, on average, in Hong Kong?

In 2021, each person used 142.4 m^3 of freshwater and 43.3 m^3 of seawater. The total per person per year water consumption level in that year was 185.7 m^3.

The per capita annual water consumption in 2021 is equivalent to filling up 1,238 bathtubs (each carries 150 litres of water).



Source: Water Supplies Department, 2023

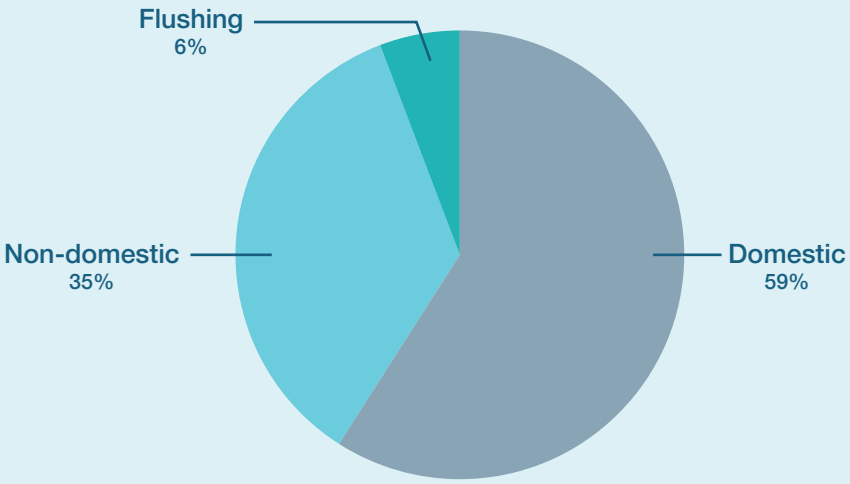
1.3 In what way has seawater been used to help meet local water demand?

Since 1957, Hong Kong started using seawater for flushing. Seawater is now used for flushing by around 85% of the population. Freshwater is used for flushing by the remaining 15%.

1.4 What is the composition of freshwater consumption, by sector?

The domestic sector uses 59% of Hong Kong's freshwater. The non-domestic sector accounts for 35%. Flushing takes up 6% of the freshwater supply.

Composition of freshwater consumption, by sector, 2021



Source: Water Supplies Department, 2023

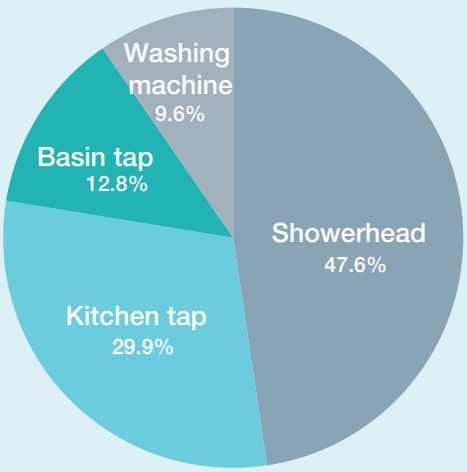
1.5 How much tap-water does each person use at home every day?

In 2023/24, daily tap-water usage at home (i.e., per capita daily domestic freshwater consumption) was 120.9 litres.

1.6 What is the end-use composition of household tap-water usage?

In 2023/24, household tap-water usage comprised four major end-use categories: Showerhead (47.6%); kitchen tap (29.9%); basin tap (12.8%); and washing machine (9.6%).

End-use composition of household tap-water usage



Source: HKU Water Centre, 2024

2. Water demand management: Current situation

Water demand management refers to policy measures that aim at controlling and reducing water consumption. Informed by an understanding of usage patterns—trends and composition, a comprehensive demand management strategy should enable the formulation and implementation of water conservation measures to effectively tackle the underlying causes of increasing levels of water consumption.

Water demand management

2.1 What is water demand management?

Water demand management denotes a set of strategies and practices that help teach people on how to use freshwater resources efficiently and to reduce the amount of freshwater consumption.

2.2 Why should we conserve water?

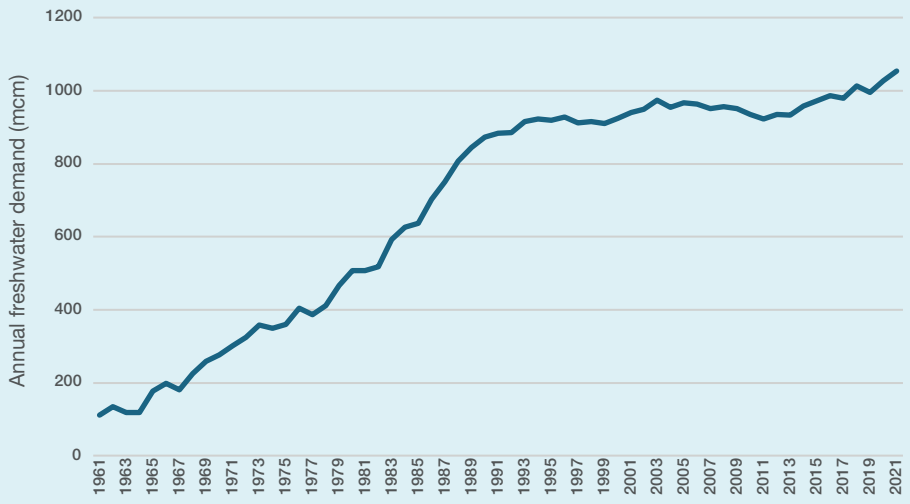
Individual water conservation actions, through the reduction of water consumption, could yield significant gains for the global climate system and local biodiversity conservation.

Taking a shorter shower at home, for instance, could result in a reduction in energy used for water heating. This action could also indirectly help reinvigorate drainage basin ecosystem health through river restoration projects, enabled by a reduction in abstraction of water from local and regional river basins.

2.3 What is the current freshwater demand in Hong Kong?

The total freshwater demand in Hong Kong in 2021 was 1,055 million cubic meter (mcm).

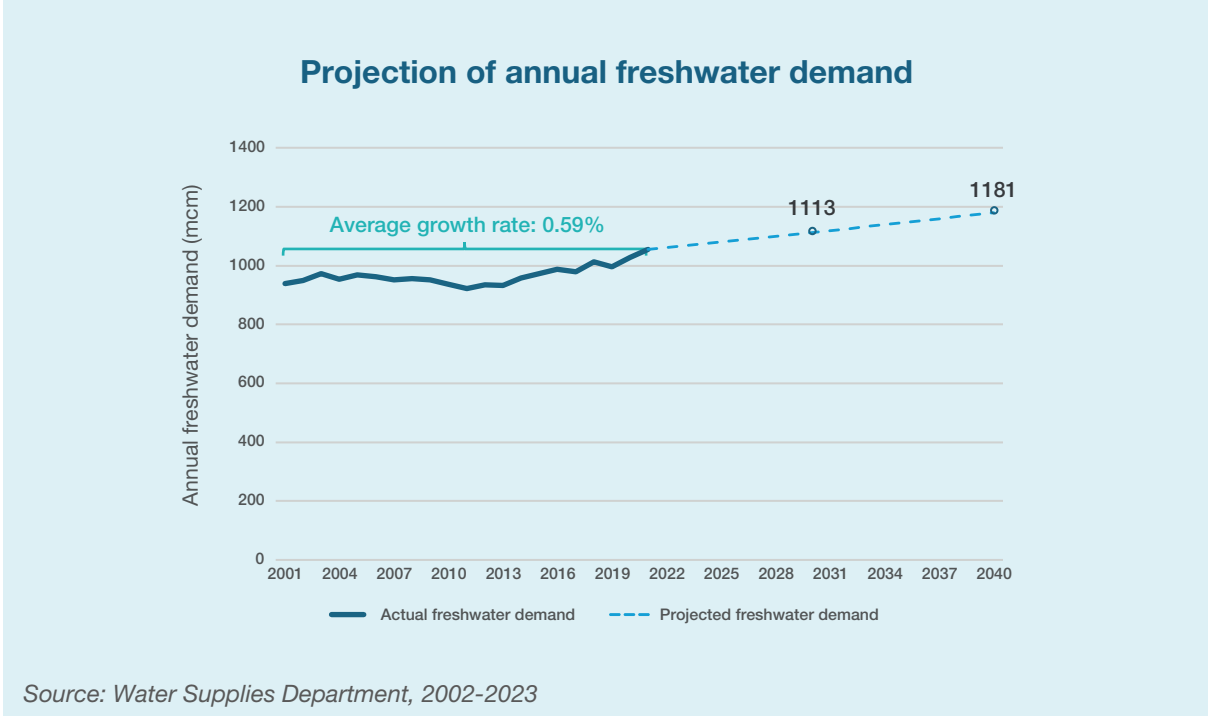
Annual freshwater demand, 1961-2021



Source: Chen, 2021; Water Supplies Department, 1999-2023

2.4 What is the forecast of future annual freshwater demand for Hong Kong?

Based on the freshwater consumption trend of the past 20 years, which averaged an annual growth rate of 0.59%, we project that Hong Kong's demand for freshwater will reach 1,113 million cubic meter (mcm) in 2030 and 1,181 mcm in 2040.



Source: Water Supplies Department, 2002-2023

2.5 What are the major water demand management initiatives?

The major water demand management initiatives include:

i. Conducting water audits to understand how much water is used or lost in the water supply system;
ii. Minimising water loss through leakage control;
iii. Implementing accurate metering for accountability;
iv. Structuring water rates to reflect true costs and encourage conservation;
v. Analysing end-user behaviours for targeted conservation programs, and
vi. Formulating comprehensive plans with measurable goals.

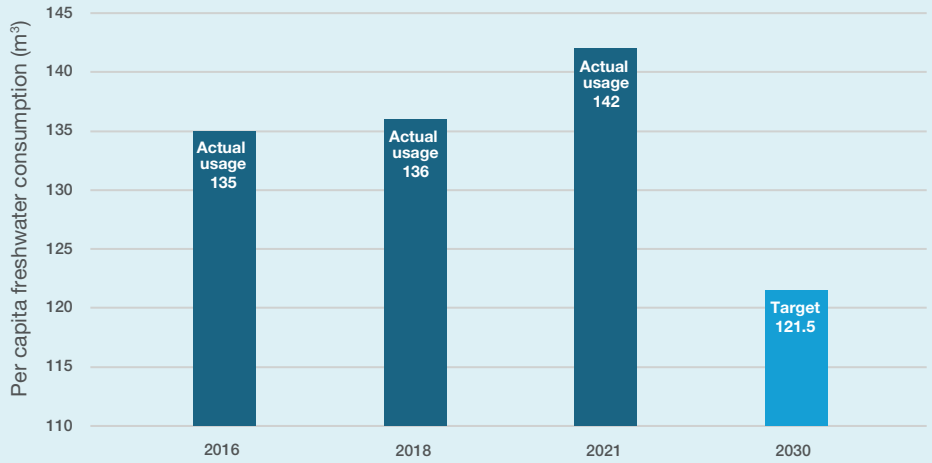
Water conservation target

2.6 What is Hong Kong's water conservation target?

Hong Kong's official water conservation target, as outlined in the 2017 Policy Address, is a 10% reduction in per capita freshwater consumption by 2030, using 2016 as the base year.

With a per capita annual freshwater consumption of 135 m^3 in 2016, the target translates into 121.5 m^3 by 2030.

Annual per capita freshwater consumption (actual and targeted)



Source: Office of the Chief Executive, HKSAR Government, 2017; Water Supplies Department, 2018 ,2020 & 2023

2.7 To what extent has Hong Kong made progress in implementing its water conservation efforts?

As of 2021, Hong Kong has fallen short of expectations in water conservation.

Theorectically, the original target could be met by a steady reduction in freshwater demand at an annual rate of 0.75%.

However, the actual consumption level in 2021 reached 142 m^3, exceeding the stated goal by 9.21%.

Given this trend of increasing consumption levels, a more aggressive approach is deemed necessary. It would require an annual reduction rate of 1.72% between 2022 and 2030 for the city to meet its new water conservation target, which was stated in the 2017 Policy Address.

Water loss control

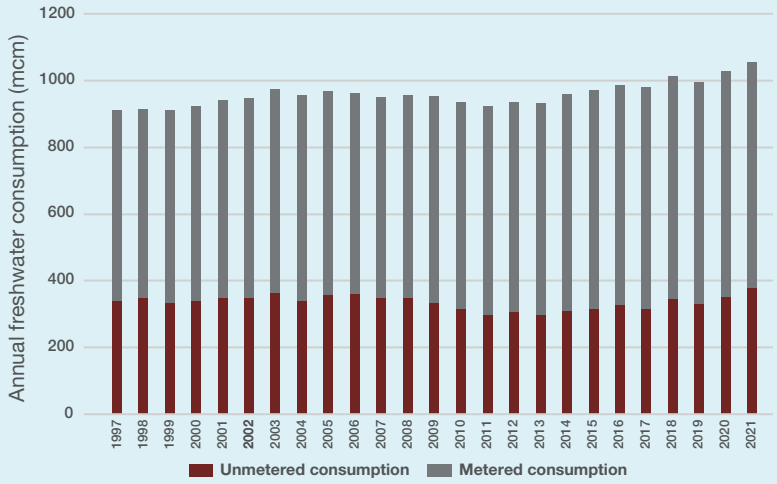
2.8 What is unmetered water consumption?

Unmetered water consumption refers to the portion of treated water that has been consumed but is not measured by any meters. Unmetered water consumption includes water losses within the water delivery system (e.g., water mains leakage) and authorised unmetered consumption (e.g., water used for firefighting and the operation of waterworks).

2.9 What proportion of Hong Kong's water consumption is unmetered?

In 2021, out of 1,055 million cubic meter (mcm) of total freshwater consumption, 378 mcm were unmetered. This figure is equivalent to 35.8% of total freshwater consumption in that year.

Unmetered and metered freshwater consumption



Source: Water Supplies Department, 1998-2023

3. Water demand management: An International perspective

An assessment of the efficacy of local water conservation policies calls for a comparison of Hong Kong's water consumption trends with those of overseas cities. This comparative perspective is crucial for gaining insights into Hong Kong's relative position in relation to global trends.

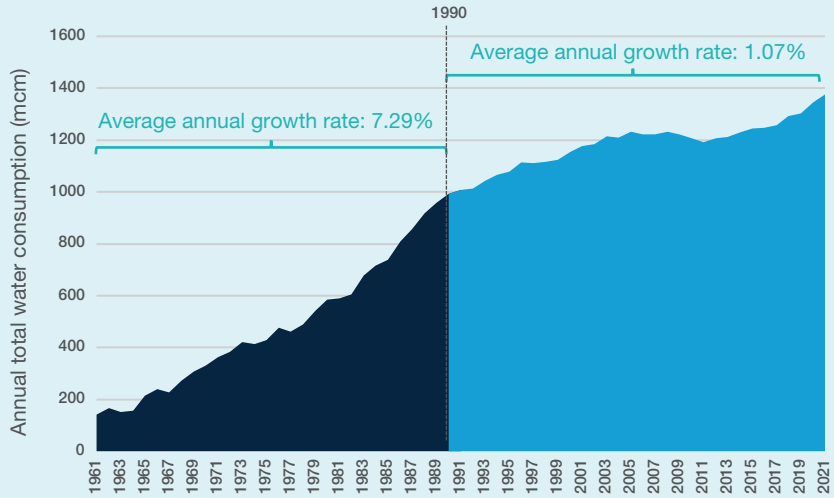
Water consumption pattern

3.1 In what ways has Hong Kong's total water consumption trajectory changed over the years?

The total water consumption in Hong Kong has undergone two distinct phases of change.

In the industrialisation phase, starting from 1961 and ending around 1990, Hong Kong recorded a rapid increase in water consumption, with an average annual growth rate of 7.29%. Next, in the de-industrialisation phase, which lasted from 1991 to 2021, total consumption level gradually stabilised, marked by an average annual growth rate of 1.07%.

Annual total water consumption (freshwater and seawater), 1961-2021



Source: Chen, 2021; Ho, 2009; Water Supplies Department, 1999-2023

3.2 Have other cities experienced a similar stabilisation trend in water consumption as that observed in Hong Kong?

Yes, many overseas cities, such as New York, Seattle and Tokyo, have undergone a similar stabilisation trend in water consumption. These cities have experienced a slowdown or a reduction in the growth rate of water consumption, which was often associated with factors such as de-industrialisation.

This phenomenon, characterised by a gradual and persistent reduction in annual growth rate of total water use due to de-industrialisation, is commonly referred to as the Maturing Water Economy effect.

3.3 How does Hong Kong's per capita water consumption level compare to those of overseas cities?

Compared to overseas cities, Hong Kong has recorded a relatively high per capita water consumption level.

Water consumption levels in Hong Kong and selected overseas cities, 2021

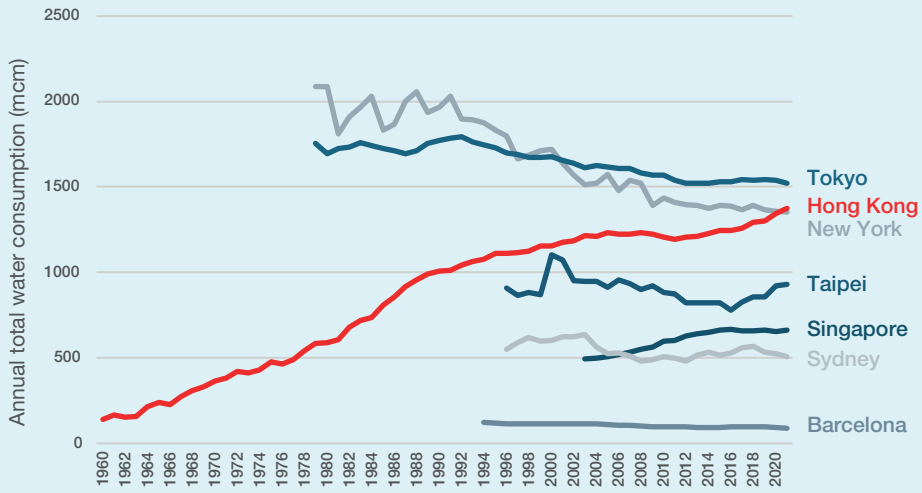
	Population (million)	Total water consumption (mcm)	Per capita water consumption (m^3)
Taipei	2.7	932.1	341.4
Beijing	21.9	4080.0	186.4
Hong Kong	7.4	1376.0	185.7
New York	8.5	1352.7	159.7
Macau	0.7	86.3	126.9
Singapore	5.5	661.7	121.4
Tokyo	14.0	1521.4	108.7
Sydney	5.3	509.1	96.8
Barcelona	1.6	88.0	53.7

Source: Please refer to References

3.4 How does Hong Kong's water consumption trend compare to those of overseas cities?

Since the early 1980s, the overall trend of water consumption in many overseas cities has been decreasing or has been levelling off. Hong Kong, to the contrary, has recorded a slightly upward trend.

Total water consumption level in Hong Kong and selected overseas cities

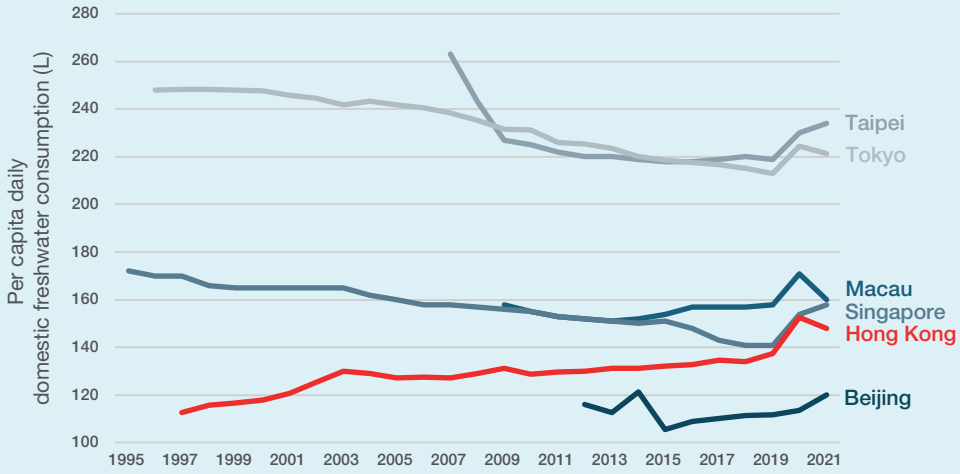


Source: Please refer to References

3.5 How does Hong Kong's domestic water consumption level compare to those of overseas cities?

In contrast to several Asian cities, Hong Kong has recorded an upward trend in domestic water consumption level since the mid 1990s.

Comparison of per capita domestic water consumption in Hong Kong and some selected Asian cities



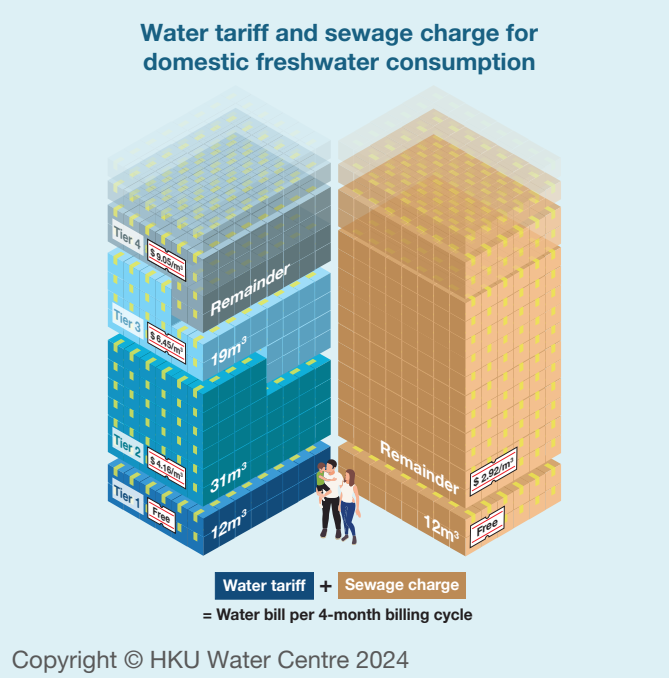
Source: Please refer to References

Water tariff

3.6 How much does residential water usage cost?

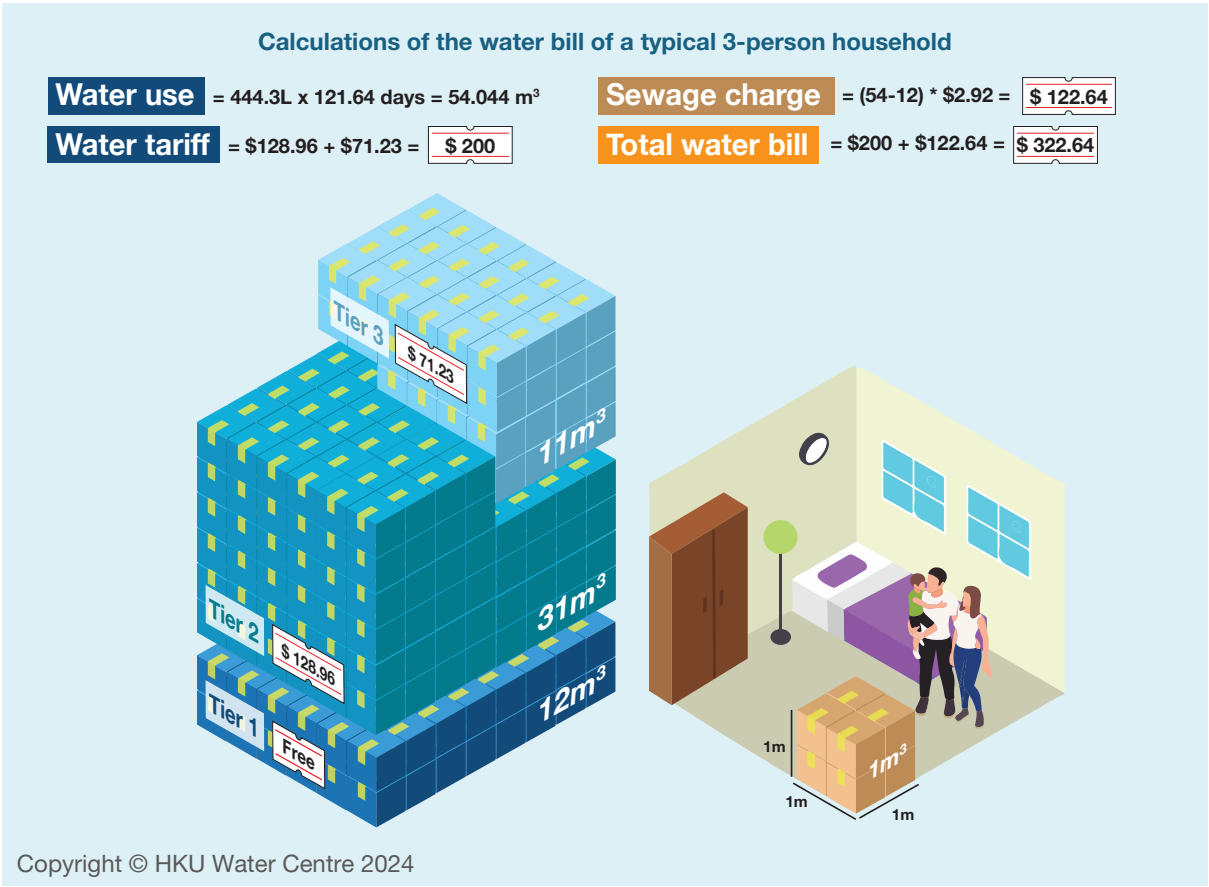
Tier 1 (first 12m³): Free
Tier 2 (the next 31m³): $4.16/m³
Tier 3 (the next 19m³): $6.45/m³
Tier 4 (the remainder): $9.05/m³

Sewage charge: $2.92/m³, with an exemption for the first 12 m³



3.7 What is the dollar amount of a typical water bill for an average family?

For a typical 3-person household, the water bill covering a 4-month period would cost $322.64. This amount includes a water tariff of $200 and a sewage charge of $122.64.



3.8 What are the rates of non-domestic water charges in Hong Kong?

For trade: $4.58/m^3
For construction: $7.11/m^3
For non-ocean-going shipping: $4.58/m^3

3.9 What is the full unit production cost of water in Hong Kong?

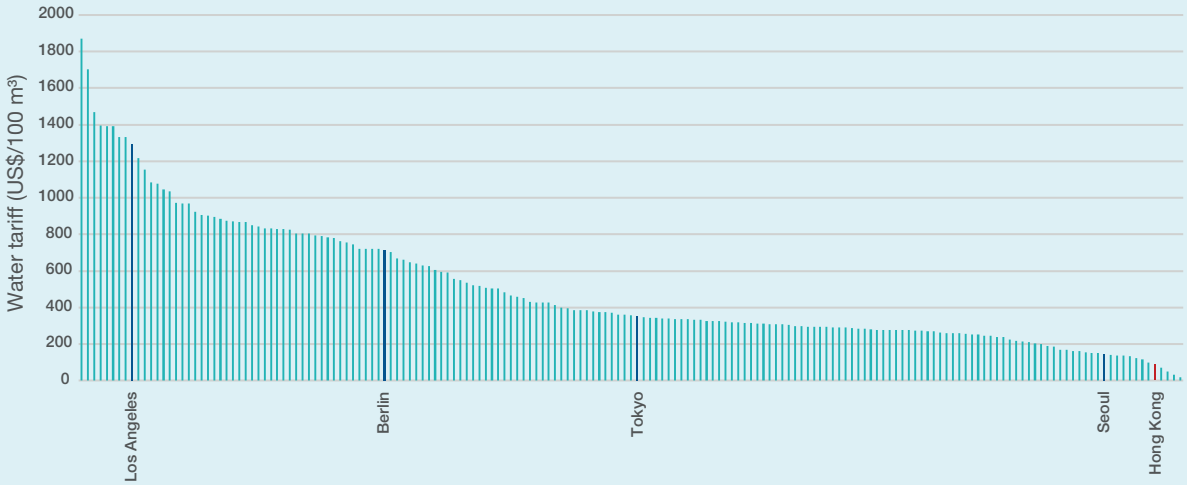
According to WSD's Annual Report, the full unit production cost was $17.7 per cubic meter in 2021/22.

The full unit production cost has factored in purchase costs, treatment expenses, maintenance of infrastructure, and ensuring a reasonable return on the investments made in water facilities.

3.10 How does Hong Kong's water tariff level compare to those of overseas cities?

Compared to most overseas cities, the water tariff in Hong Kong is very low.

Water tariff level in Hong Kong and overseas cities, 2021

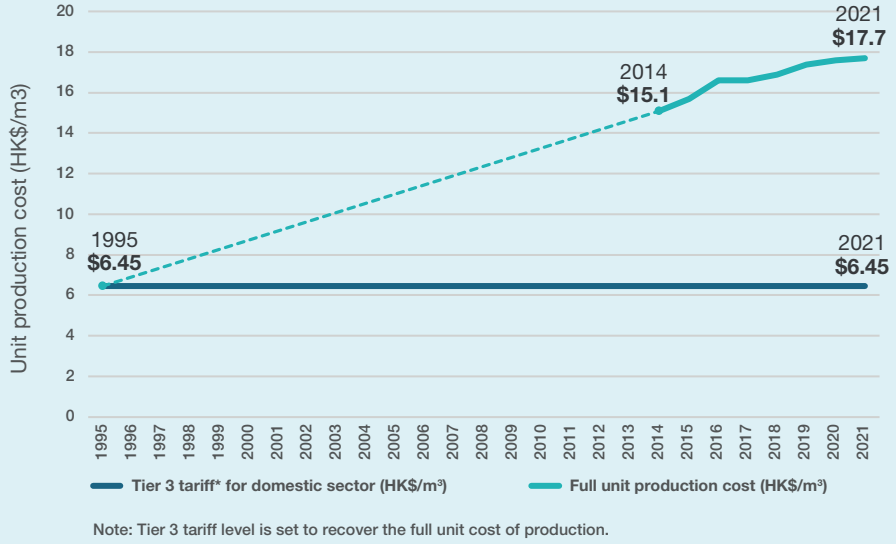


Source: International Water Association, 2022

3.11 Why is tap water so cheap in Hong Kong?

Tap water in Hong Kong seems to be cheap, from the users' perspective, because it is heavily subsidised. The water tariff in Hong Kong has not been adjusted since 1995. As a result, the tariff level is much lower than the actual cost of water production.

Water tariff and the actual unit production cost of water, 1995-2021



Note: Tier 3 tariff level is set to recover the full unit cost of production.

Source: Water Supplies Department, 1999-2023

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References

1. Water consumption

Introduction
Water Supplies Department, 2023. *Annual Report 2021/22*, p.19. Available at: https://www.wsd.gov.hk/filemanager/common/annual_report/2021_22/pdf/WSD_AR2021-22.pdf [Accessed Feb 2024]

1.1
Water Supplies Department, 2023. *Annual Report 2021/22*, p.118. Available at: https://www.wsd.gov.hk/-filemanager/common/annual_report/2021_22/pdf/WSD_AR2021-22.pdf [Accessed Feb 2024]

1.2
Water Supplies Department, 2023. *Annual Report 2021/22*, p.118. Available at: https://www.wsd.gov.hk/-filemanager/common/annual_report/2021_22/pdf/WSD_AR2021-22.pdf [Accessed Feb 2024]

1.3
Water Supplies Department, 2023. *Annual Report 2021/22*, p.21. Available at: https://www.wsd.gov.hk/filemanager/common/annual_report/2021_22/pdf/WSD_AR2021-22.pdf [Accessed Feb 2024]

1.4
Water Supplies Department, 2023. *Annual Report 2021/22*, p.19. Available at: https://www.wsd.gov.hk/filemanager/common/annual_report/2021_22/pdf/WSD_AR2021-22.pdf [Accessed Feb 2024]

1.5
The 2023/24 data were provided by the research team working on a project entitled “Harnessing the Power of IoT Technologies, Data Analytics and Advanced Household Profiling Techniques to Sustain Water-conscious Behaviours and to Inform Water-sector Infrastructure Planning”. The research project (S2021.A8.034.21S) is funded by the HKSAR Government’s Strategic Public Policy Research Funding Scheme.

1.6
The 2023/24 data were provided by the research team working on a project entitled “Harnessing the Power of IoT Technologies, Data Analytics and Advanced Household Profiling Techniques to Sustain Water-conscious Behaviours and to Inform Water-sector Infrastructure Planning”. The research project (S2021.A8.034.21S) is funded by the HKSAR Government’s Strategic Public Policy Research Funding Scheme.

2. Water demand management: Current situation

Water demand management
2.3
Water Supplies Department, 1999-2023. *Annual Report 1998/99-2021/22*, Annual Quantity of Fresh Water Supply. Available at: https://www.wsd.gov.hk/en/publications-and-statistics/pr-publications/list-of-publications/index.html [Accessed Feb 2024]

Chen, Y. D., 2001. *Sustainable development and management of water resources for urban water supply in Hong Kong*, Water International, 26(1), p.124. DOI: 10.1080/02508060108686891

2.4
Water Supplies Department, 2002-2023. Annual Report 2001/02-2021/22, Annual Quantity of Fresh Water Supply. Available at: https://www.wsd.gov.hk/en/publications-and-statistics/pr-publications/list-of-publications/index.html [Accessed Feb 2024]

2.5
US Environmental Protection Agency, 2016. *Best Practices to Consider When Evaluating Water Conservation and Efficiency as an Alternative for Water Supply Expansion*. Available at: https://www.epa.gov-/sites/default/files/2016-12/documents/wc_best_practices_to_avoid_supply_expansion_2016_508.pdf [Accessed Feb 2024]

Water conservation target

2.6

Office of the Chief Executive, HKSAR Government, 2017. *The Chief Executive's 2017 Policy Address*, Policy Agenda, p.117. Available at: https://www.policyaddress.gov.hk/2017/eng/pdf/Agenda.pdf [Accessed Feb 2024]

Water Supplies Department, 2018. *Annual Report 2016/17*, p.93. Available at: https://www.wsd.gov.hk/filemanager/common/annual_report/2016_17/common/pdf/15_appendices.pdf [Accessed Feb 2024]

2.7

Office of the Chief Executive, HKSAR Government, 2017. *The Chief Executive's 2017 Policy Address*, Policy Agenda, p.117. Available at: https://www.policyaddress.gov.hk/2017/eng/pdf/Agenda.pdf [Accessed Feb 2024]

Water Supplies Department, 2018. *Annual Report 2016/17*, p.93. Available at: https://www.wsd.gov.hk/filemanager/common/annual_report/2016_17/common/pdf/15_appendices.pdf [Accessed Feb 2024]

Water Supplies Department, 2020. *Annual Report 2018/19*, p.104. Available at: https://www.wsd.gov.hk/-filemanager/common/annual_report/2018_19/pdf/Data_Summary.pdf [Accessed Feb 2024]

Water Supplies Department, 2023. *Annual Report 2021/22*, p.118. Available at: https://www.wsd.gov.hk/-filemanager/common/annual_report/2021_22/pdf/WSD_AR2021-22.pdf [Accessed Feb 2024]

Water loss control

2.8

Audit Commission, 2015. *Report No. 64 of the Director of Audit*, Chapter 4, para. 1.3. Available at: https://www.aud.gov.hk/pdf_e/e64ch04.pdf [Accessed Feb 2024]

2.9

Water Supplies Department, 1998-2023. *Annual Report 1997/98-2021/22*, Waterworks – operating accounts, Review of the year. Available at: https://www.wsd.gov.hk/en/publications-and-statistics/pr-publications/list-of-publications/index.html [Accessed Feb 2024]

Water Supplies Department, 1998-2023. *Annual Report 1997/98-2021/22*, Annual Quantity of Fresh Water Supply. Available at: https://www.wsd.gov.hk/en/publications-and-statistics/pr-publications/list-of-publications/index.html [Accessed Feb 2024]

3. Water demand management: An International perspective

Water consumption pattern

3.1

Water Supplies Department, 1999-2023. *Annual Report 1998/99-2021/22*, Annual Quantity of Fresh Water Supply. Available at: https://www.wsd.gov.hk/en/publications-and-statistics/pr-publications/list-of-publications/index.html [Accessed Feb 2024]

Chen, Y. D., 2001. *Sustainable development and management of water resources for urban water supply in Hong Kong*, Water International, 26(1), p.124. DOI: 10.1080/02508060108686891

Water Supplies Department, 1999-2023. *Annual Report 1998/99-2021/22*, Annual Salt Water Consumption and Population Served with Salt Water. Available at: https://www.wsd.gov.hk/en/publications-and-statistics/pr-publications/list-of-publications/index.html [Accessed Feb 2024]

Ho, P.Y., 2009. *Water for a Barren Rock. Hong Kong*: The Commercial Press (H.K) Ltd., p 141.

The seawater consumption data for 1961 to 1970 were conservative estimates made by the authors.

3.3
For Barcelona:
(Only available in Catalan) Ajuntament de Barcelona, 2023. *Anuari Estadístic de la Ciutat de Barcelona 2022*, p.288. Available at: https://ajuntament.barcelona.cat/estadistica/catala/Anuaris/Anuari/Anuari2022.pdf [Accessed Feb 2024]

Barcelona City Council, 2022. *Barcelona in Figures 2021/2022*, p.4. Available at: https://www.barcelona.cat/internationalwelcome/sites/default/files/DATA_SHEET_2022_ang_doblepag_2.pdf [Accessed Feb 2024]

For Beijing:
(Only available in Chinese) 北京市水務局（2022）。《北京市水務統計年鑒 2021》，1頁。取自：https://swj.beijing.gov.cn/zwgk/swtjnj/202304/P020230413622598219651.pdf [查詢日期：2024年2月]

(Only available in Chinese) 北京市統計局國家統計局北京調查總隊（2022）。〈北京市2021年國民經濟和社會發展統計公報〉，表2 2021年末常住人口及構成。取自：https://tjj.beijing.gov.cn/zxfbu/202202/t20220228_2618115.html [查詢日期：2024年2月]

For Hong Kong:
Water Supplies Department, 2023. *Annual Report 2021/22*, p.118. Available at: https://www.wsd.gov.hk/filemanager/common/annual_report/2021_22/pdf/WSD_AR2021-22.pdf [Accessed Feb 2024]

Census and Statistics Department, 2024. *Table 110-01001 : Population by Sex and Age Group*, Statistics. Available at: https://www.censtatd.gov.hk/en/web_table.html?id=110-01001 [Accessed Feb 2024]

For Macau:
(Only available in Chinese) 海事及水務局（2022）。《2022澳門水資源狀況報告》，17頁。取自：https://www.marine.gov.mo/upload_files/20220518143750_7055475.pdf [查詢日期：2024年2月]

Statistics and Census Service, 2022. *Demographic Statistics*, 4th Quarter 2021. Available at: https://www.dsec.gov.mo/getAttachment/1be49b88-9f89-49b6-9371-3e054cd539b8/E_DEM_FR_2021_Q4.aspx [Accessed Feb 2024]

For New York:
Department of Environmental Protection (DEP), 2023. *Water Consumption in the City of New York*, Data. Available at: https://data.cityofnewyork.us/Environment/Water-Consumption-in-the-City-of-New-York/ia2d-e54m/data_preview [Accessed Feb 2024]

World Population Review, 2024. New York City, *New York Population 2024*, New York City Population by Year. Available at: https://worldpopulationreview.com/us-cities/new-york-city-ny-population [Accessed Feb 2024]

For Singapore:
Department of Statistics Singapore, 2023. *Water Sales*. Available at: https://tablebuilder.singstat.gov.sg/table/TS/M890421 [Accessed Feb 2024]

Department of Statistics Singapore, 2021. *Population Trends* 2021, p.vii. Available at: https://www.singstat.gov.sg/-/media/files/publications/population/population2021.pdf [Accessed Feb 2024]

For Sydney:
Sydney Water, 2022. *Water Conservation Report 2021-2022*, p.16. Available at: https://www.sydneywater.com.au/content/dam/sydneywater/documents/water-conservation-report_21-22.pdf [Accessed Feb 2024]

Australian Bureau of Statistics, 2022. *Regional population*, Population by capital city. Available at: https://www.abs.gov.au/statistics/people/population/regional-population/2021 [Accessed Feb 2024]

For Taipei:
Taipei Water Department, 2022. *Statistical Yearbook 2021*, p.106. Available at: https://www-ws.gov.taipei/Download.ashx?u=LzAwMS9VcGxvYWQvMzA2L3JlbGZpbGUvNDE1NTUvODU2MzU0OC84ZTgwNTcxMC03MDQ1LTRkMDAtOWYxNS03ZmE0OGZlYWQxYjMucGRm&n=MTEw5bm05YWo5pu4LeW3suWjk%2be4rjIxMTEwNzEx5L%2buLnBkZg%3d%3d&icon=.pdf [Accessed Feb 2024]

Dept. of Household Registration, Ministry of the Interior, n.d.. *Statistics*, End of Year, Table 1. Population by Sex and 5 Year Age Group for Counties and Cities. Available at: https://www.ris.gov.tw/app/en/3910 [Accessed Feb 2024]

For Tokyo:
(Only available in Japanese) Bureau of Waterworks Tokyo Metropolitan Government, 2023. *125 years' history of Tokyo Modern Waterworks*, p.126. Available at: https://www.waterworks.metro.tokyo.lg.jp/-files/items/20386/File/125nenshi.pdf [Accessed Feb 2024]

Tokyo Metropolitan Government, n.d.. *Geography of Tokyo*. Available at: https://www.metro.tokyo.lg.jp/english/about/history/history02.html [Accessed Feb 2024]

3.4
Water Supplies Department, 1999-2023. *Annual Report 1998/99-2021/22*, Annual Quantity of Fresh Water Supply. Available at: https://www.wsd.gov.hk/en/publications-and-statistics/pr-publications/list-of-publications/index.html [Accessed Feb 2024]

Chen, Y. D., 2001. *Sustainable development and management of water resources for urban water supply in Hong Kong*, Water International, 26(1), p.124. DOI: 10.1080/02508060108686891

Water Supplies Department, 1999-2023. *Annual Report 1998/99-2021/22*, Annual Salt Water Consumption and Population Served with Salt Water. Available at: https://www.wsd.gov.hk/en/publications-and-statistics/pr-publications/list-of-publications/index.html [Accessed Feb 2024]

Ho, P.Y., 2009. *Water for a Barren Rock*. Hong Kong: The Commercial Press (H.K) Ltd., p 141.

The seawater consumption data for 1961 to 1970 were conservative estimates made by the authors.

For reference materials used to compile the data of other cities, please contact the Water Centre.

3.5
Water Supplies Department, 1999-2023. *Annual Report 1998/99-2021/22*, Per Capita Domestic Fresh Water Consumption. Available at: https://www.wsd.gov.hk/en/publications-and-statistics/pr-publications/list-of-publications/index.html [Accessed Feb 2024]

For reference materials used to compile the data of other cities, please contact the Water Centre.

Water tariff
3.6
Water Supplies Department, 2002-2023. *Annual Report 2001/02-2021/22*, Finance and Water Charges. Available at: https://www.wsd.gov.hk/en/publications-and-statistics/pr-publications/list-of-publications/index.html [Accessed Feb 2024]

3.7
Water Supplies Department, 2002-2023. *Annual Report 2001/02-2021/22*, Finance and Water Charges. Available at: https://www.wsd.gov.hk/en/publications-and-statistics/pr-publications/list-of-publications/index.html [Accessed Feb 2024]

3.8
Water Supplies Department, 2002-2023. *Annual Report 2001/02-2021/22*, Finance and Water Charges. Available at: https://www.wsd.gov.hk/en/publications-and-statistics/pr-publications/list-of-publications/index.html [Accessed Feb 2024]

3.9
Water Supplies Department, 2002-2023. *Annual Report 2001/02-2021/22*, Finance and Water Charges. Available at: https://www.wsd.gov.hk/en/publications-and-statistics/pr-publications/list-of-publications/index.html [Accessed Feb 2024]

3.10
International Water Association, 2022. Total Charges for Cities in 2021 For A Consumption Of 100 m^3. Available at: http://waterstatistics.iwa-network.org/ [Accessed Feb 2024]

3.11
Water Supplies Department, 2002-2023. *Annual Report 2001/02-2021/22*, Finance and Water Charges. Available at: https://www.wsd.gov.hk/en/publications-and-statistics/pr-publications/list-of-publications/index.html [Accessed Feb 2024]

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The Centre for Water Technology and Policy at The University of Hong Kong is an inter-faculty collaborative unit between the Faculty of Engineering and Faculty of Social Sciences. Through inter-disciplinary research and analysis, the Water Centre generates professional insights on complex, multi-dimensional problems in the urban water sector. The strengths of engineering and social sciences disciplines are purposefully converged and fused, through innovative inter-disciplinary research design and analytical lens, to create unique diagnostic capabilities for us to deliver on those insights.

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