

Water Quality Achieving the Highest National Standard



The Advisory Committee on Water Supplies visited Dongjiang in November 2023

Highest National Standard of Dongjiang Water Quality

The Dongjiang Water Supply Agreement signed between Guangdong and Hong Kong requires the quality of Dongjiang water supplied to Hong Kong to comply with the national standard set out for Type II waters in the "Environmental Quality Standards for Surface Water" (GB3838-2002). This is the highest standard applicable for water abstraction for human consumption in the national standard. Over the years, Guangdong and Hong Kong have made great efforts to secure the water quality of Dongjiang water.

Measures on Water Quality Taken by the Guangdong Provincial Government

- Formulate and implement regulations and measures to strictly protect water resources including prohibition of pollution activities such as quarrying, mining and extensive poultry farming within protection zones, and relocation of factories with pollution near Dongjiang
- Carry out the following major infrastructure works:

Relocation of the intake point to upstream

Completed in 1998

The intake point of Dongjiang water was relocated to an upstream location of better water quality.

Dedicated Aqueduct

Completed in 2003

Construction of a dedicated aqueduct from Taiyuan at Dongjiang to Shenzhen Reservoir to improve the quality of Dongjiang water delivered to Hong Kong.

Shima River Sewage Diversion Works

Completed in 2005

Works including the construction of a rubber dam to intercept sewage from the Shima River to avoid contaminating the source of Dongjiang water.

Comprehensive Remediation Project for the Water Environment of the Shawan River Basin

Completed in 2020

Works including desilting the river channel, laying sewage pipes and expanding the sewage treatment plant to reduce direct discharge of effluent to the river in order to reduce the risk of contamination of the Shenzhen Reservoir.

Bio-nitrification plant

Completed in 1999

It is situated at the inlet of Shenzhen Reservoir, making use of the biological contact oxidation process to degrade the contaminants in the water.



Dedicated Aqueduct - Jinhu Elevated Channel



Bio-nitrification plant

Shawan River Sewage Interception Works

Completed in 2003

Before being polluted by domestic effluent, Shawan River was part of the river network that formed the catchment of the Shenzhen Reservoir. Shawan River Dam was constructed under this project to intercept sewage and deliver it to a sewage treatment plant for treatment to avoid contaminating the raw water in the Shenzhen Reservoir.

Dongjiang Water Resource Protection Works at Shima River Mouth, Stage 1

Completed in 2020

Major construction including the new water gate to intercept sewage at the mouth of the Shima River.

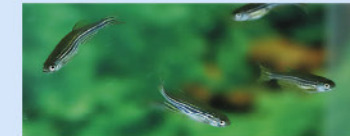
Water quality monitoring measures at the reception of Dongjiang water in Hong Kong

Comprehensive water quality monitoring

The Water Supplies Department has installed a 24-hour on-line monitoring system at the reception point of Dongjiang water at the Muk Wu Raw Water Pumping Station to monitor the quality of Dongjiang water supplied to Hong Kong and measure various parameters in real time.

Biosensing Alert System

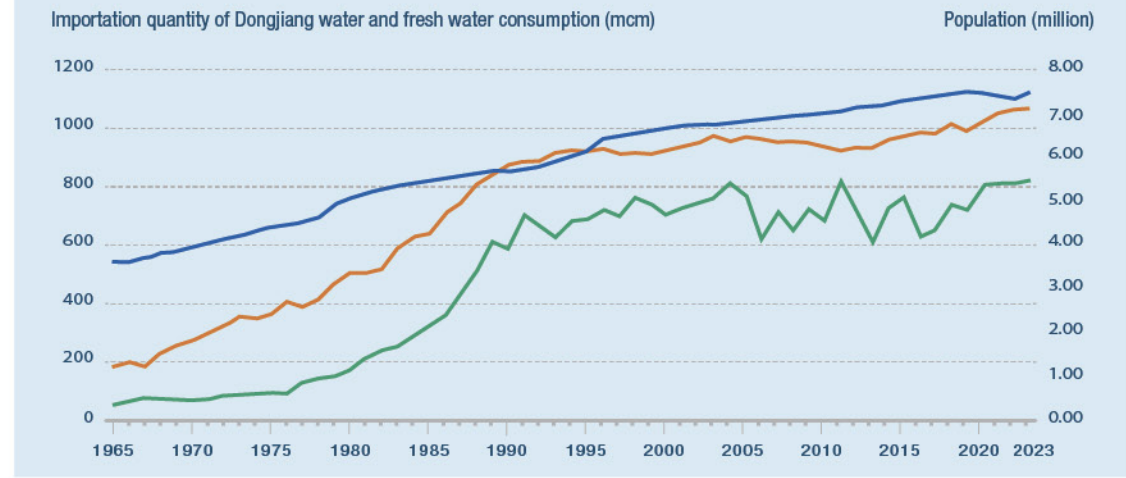
The Water Supplies Department self-innovated a biosensing alert system with application of zebrafish to detect abnormalities in raw water to ensure that appropriate measures can be taken in a timely manner.



Zebrafish

Strong Links between Guangdong and Hong Kong

The Guangdong Province and Hong Kong maintain close liaison relating to the water quality of Dongjiang water supply to Hong Kong, including Guangdong/Hong Kong Water Supply Business Meeting, Guangdong/Hong Kong Water Supply Operation and Management Technical Cooperation Sub-group Meeting, and Special Panel Meeting on the Protection of Dongjiang Water Quality. The Advisory Committee on Water Supplies also visits to Dongjiang every year to learn about the situation of Dongjiang water supply to Hong Kong and relay the concerns of Hong Kong citizens about the quality of Dongjiang water to the Guangdong authorities.



Hong Kong's Population, importation quantity of Dongjiang water and fresh water consumption in the past

- Population
- Fresh water consumption
- Importation quantity of Dongjiang water

Guaranteed Water Quantity Safeguards Water Security

Dongjiang is the main water source for Guangzhou, Shenzhen, Dongguan, Huizhou, Heyuan etc. It also shoulders the supply to Hong Kong. It is serving more than 40 million population in total. Dongjiang River Basin is an area of water scarcity by international standard as the per capita water resource in the area is only 1,100 cubic meters per year.

Nevertheless, the Dongjiang Water Supply Agreement guarantees an annual supply ceiling of 820 million cubic meters, which ensures continuous water supply in Hong Kong during the extreme drought of the century. Accordingly, Hong Kong's water supply reliability has reached 99%.

The Dongjiang Water Supply Agreement also provisions that, if necessary, the supply of Dongjiang water to Hong Kong can be further increased to 1.1 billion cubic metres per year which provides a better safeguard for Hong Kong's water security.

Guangdong's Worst Drought in Recent 60 years

In 2021, Guangdong also experienced the worst drought in recent 60 years. With the guaranteed supply ceiling provided by the Dongjiang Water Supply Agreement, 810 million cubic meters of Dongjiang water was still supplied to Hong Kong, thus avoiding implementation of water rationing measures in Hong Kong.

Pearl River Delta Water Resources Allocation Project

This project aims to channel water from the Xijiang in the west to the eastern Pearl River Delta, including Nansha, Guangzhou, Shenzhen and Dongguan, to provide new water sources to alleviate the demand for Dongjiang water in these areas. After the project completion in end 2023, Dongjiang water supply to Hong Kong can be further secured.



Sheung Shui Water Treatment Works
Dongjiang raw water



Increasing Resilience through Innovative and Agile Measures

"Package Deal" Approach

Since 2006, Hong Kong has purchased Dongjiang water by "Package Deal" approach. As such, the importation of Dongjiang water supply is requested every month based on actual need. This results in flexibility in managing water storage in Hong Kong and hence avoids wasting Dongjiang water resources and saves energy cost of transporting water.

Overflow mainly occurs in small and medium-sized reservoirs built for low demand between the 19th and mid-20th centuries. During heavy rains, overflow occurs when the collected rainwater exceeds the design capacity of reservoirs. The excess water is safely drained away through the designed overflow facilities of the reservoir to ensure safety of the facilities or passage on top of the dam.

Desalination

Desalination is the Government's strategy to explore new water sources in order to enhance the resilience of water supply in face of climate change challenge. Implementation of desalination requires consideration of various factors, such as availability of suitable coastal locations for desalination plant, cost-effectiveness, etc.

Dongjiang water accounts for about 70% to 80% of fresh water consumption in Hong Kong. The first stage of Tseung Kwan O desalination plant commissioning at end 2023 can output fresh water of 135,000 cubic meters maximum per day, accounting for about 5% of Hong Kong's water consumption. It is mainly used to supplement the plausible loss of local yield due to climate change impact. Currently, there are constraints for desalination to replace Dongjiang water supply.



Bellmouth Overflow at Shing Mun Reservoir



H2OPE CENTRE

Water Conservation Preparing for the Worst

To address the potential water crisis, the Water Supplies Department has implemented the "Total Water Management Strategy" since 2008. The Strategy has been reviewed and updated in 2019 to adopt a two-pronged approach with emphasis on diversified and reliable water supply and suppressed water demand growth. Water conservation requires the joint efforts of the public. The relevant measures include the following:

Water Efficiency Labelling Scheme (WELS)

Products participating in WELS will be affixed with WELS labels to show their water efficiency which enable consumers to make informed choices.



Automatic Meter Reading (AMR) System

The AMR system provides metering data, status output and alert signals to prompt the users of abnormal water consumption, possibly due to pipe leakage so that early remedial action can be taken.



Enhancing Water Efficiency

The Water Supplies Department has formulated a series of water-saving measures, including promotion of the "Best Practice Industry Guidelines" to the catering and hotel industries, and installation of flow controllers in public rental housing estates, private housing estates, government venues and schools.

Strengthening Public Education

The Water Supplies Department has launched a number of public activities, including Cherish Water Campus, Let's Save 10L Water Campaign and Cherish Water Ambassador Scheme to promote water conservation. The H2OPE Centre was also commissioned in 2019 to introduce the water resources in Hong Kong to students and the public and raise their awareness of saving water.



Water Supply from Dongjiang to Overcome Water Stress

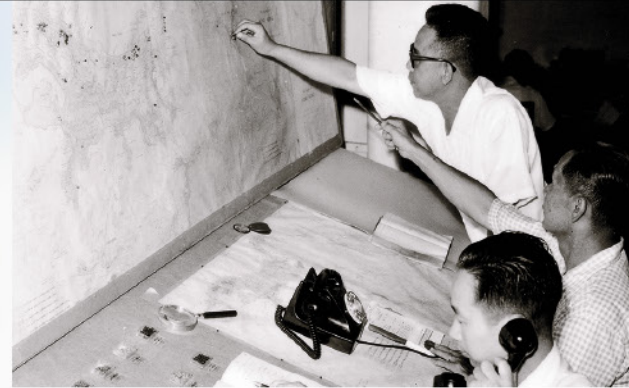
In the 1960s, Hong Kong experienced a period of water rationing during which water was supplied for only four hours in every four days. Life at that time is probably unimaginable by Hong Kong people today who are enjoying an uninterrupted water supply.



The severe drought had led to the construction of the Dongjiang Water Supply System which allowed Dongjiang water to be conveyed to Hong Kong against numerous topographical barriers from March 1965 onwards, continuously promoting the rapid development of the city in the past 60 years.

Dongjiang water accounts for 70% to 80% of total fresh water consumption in Hong Kong and its uninterrupted supply for nearly 60 years, making the city a better place for some 7 million Hong Kong people to live and work. This exhibition reviews the background of Dongjiang water supply to Hong Kong, its expansion and improvement over the years, and the measures taken by Guangdong and Hong Kong to improve water quality, etc., assuring that Dongjiang water is the long-term and strong support to Hong Kong from our country.

The Waterworks Office were busy attending to public's telephone calls during water rationing.



Severe Drought Made Life Hard

The annual rainfall in Hong Kong was 901 millimetres in 1963, which was far less than the annual average rainfall of 2,400 millimetres. The Government had to implement water rationing on 2 May 1963 that last for more than one year.



A large number of citizens queued up for fresh water during water rationing.

Water rationing measures

<p>2/5/1963 3 HOURS of water supply per day</p>	<p>16/5/1963 4 HOURS of water supply in every 2 days</p>	<p>1/6/1963 4 HOURS of water supply in every 4 days</p>	<p>27/5/1964 All water rationing MEASURES WERE LIFTED</p>
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Water Conservation Measures adopted by the Government

Water conservation measures adopted by the Government at that time

- Public swimming pools and bathrooms of public sports stadiums were closed.
- The provision or sale of water to vessels from other countries was suspended.
- Surgical operations for chronic diseases were postponed.
- Plastic pipelines were laid to convey seawater for fire-fighting purpose.
- Regulations were enacted against water wastage.

Re-opening of water wells

Following the measures adopted during the 1929 drought, the Government re-opened a number of water wells to provide Hong Kong with an additional supply of 1,800 to 2,300 cubic metres of water per day.

Delivery of raw water by tankers

Due to severe drought, the Government chartered a fleet of 14 tankers to abstract raw water from Zhujiang (Pearl River) for delivery to Hong Kong in 1963 with the consent of the Guangdong Provincial Government.

A tanker unloaded raw water at the pier in June 1963 after abstracting water from the Zhujiang Estuary



Artificial rain-making

On 31 May 1963, the Hong Kong Government attempted to make artificial rain by deploying aircrafts of the Auxiliary Air Force to spray dry ice in the sky at an altitude of 7,000 feet to the west of Cheung Chau. Unfortunately, the trial was unsuccessful.

A water conservation poster published by the Government in 1963



WINNING ENTRIES OF THE WATER CONSERVATION SLOGAN COMPETITION ORGANISED BY THE EDUCATION DEPARTMENT IN 1963



Winner
Do not waste any water as a drop is priceless when you have none.

First Runner-up
Droughts make water conservation a top priority for everyone.

Second Runner-up
Securing water supply by conserving every single drop of water.



Residents queued up to acquire water



Water buckets capable of holding 50 gallons of water were the most popular in the market.

The Public Devised Various Water Conservation Measures

Water conservation measures adopted by the public

During water rationing, concerted efforts had been made by the public, ranging from individuals to all trades and professions, to conserve water through various measures.

Reduction of individual water use

- Rural residents made the switch to wheat buns for main meals which required less water to cook.
- Urban residents consumed more canned food to avoid using water for cooking.
- Physical education lessons were cancelled in some schools to avoid creating additional needs for bathing.
- People tried not to wear white clothes which would easily get dirty.
- People ate apples after meals or before bed instead of brushing teeth.
- Disposable paper tableware was used to avoid dish washing.
- Used fresh water was recycled.

"Water token"

Some restaurants offered each of their customers three pieces of "water token" to restrict the times of refilling service for teapots that each customer could enjoy to a maximum of three.

Religious intercessions for rain

Several religious organisations invited followers to join their religious intercessions.



During the 1963 drought, the Hong Kong Joint Buddhist Association held an intercession for rain

Adverse Impacts of Unstable Water Supply on the Development of Society

Public hygiene

Water shortage under extremely hot weather had led to the spreading of diseases. A total of 115 cases of cholera were recorded by end of that year.

Economy

During the drought period, farmlands and fish ponds dried up, causing severe impact to the agricultural and fisheries industries. The commercial and industrial sectors were also greatly affected. According to the estimation of the Hong Kong and Kowloon Federation of Trade Unions (now the Hong Kong Federation of Trade Unions), a total of 19 trades had reduced or ceased their production, and 200,000 workers had experienced a pay reduction.

The two large water tanks in the squatter area of Diamond Hill, though primitive, were the main sources of water supply for the lower class.



Dongjiang Water Supply Showcasing People's Inseparable Ties



As early as in 1960, Hong Kong's economy was booming. The supply of fresh water could not keep up with the demand arising from industrial and commercial development and population increase. The Government was well aware that the increasing fresh water demand in Hong Kong could no longer be satisfied by local yield solely, and the procurement of fresh water from Guangdong Province was the most efficient way for fulfilling the unmet water needs.

Abstraction of water from the Shenzhen Reservoir in 1960

On 15 November 1960, the Governments of Guangdong Province and Hong Kong reached an agreement on importing 22.7 million cubic metres per year of raw water from the Shenzhen Reservoir to Hong Kong. A pipeline with a diameter of 48 inches (1,200 millimetres) was swiftly constructed subsequently for the delivery of water to Hong Kong from December 1960 onwards.

The Dongjiang-Shenzhen Water Supply Scheme in 1963

In 1963, the Governments of Guangdong Province and Hong Kong held several rounds of discussions and reached a consensus on the implementation of the Dongjiang-Shenzhen Water Supply Scheme. The Scheme was approved by Prime Minister Zhou Enlai and granted a special fund by the Central People's Government for its construction works at the end of the year. Meanwhile, large-scale pumping stations, pipelines and tunnels were constructed in Hong Kong to facilitate the distribution of Dongjiang water to various districts over the territory.



The first water supply agreement was signed between the Governments of Guangdong Province and Hong Kong on 15 November 1960.



A large pipeline with a diameter of about 48 inches for the reception of water from the Shenzhen Reservoir.



The representative of Hong Kong, Deputy Director of Public Works, T.O. Morgan, and the representative of Guangdong signed the second water supply agreement.



In February 1964, the Guangdong Provincial Government deployed substantial manpower and resources to carry out the construction of the Dongjiang-Shenzhen Water Supply Scheme along a 90-km route from Dongjiang to Shenzhen.

Dongjiang Water Coming Over Mountains and Against the River Current

Dongjiang is more than 50 Kilometres away from Hong Kong. It is a challenging project to transport the water from there to Hong Kong. In order to facilitate transportation, an artificial water channel of 83 kilometers long was built crossing six mountains and countering against the river current. The water was lifted from two meters above sea level to 46 meters through multi-stage pumping stations.

The project started on February 20, 1964 and was completed in around a year. At 4 pm on March 1, 1965, the supply of Dongjiang water to Hong Kong commissioned.



The route of the Dongjiang-Shenzhen Water Supply Scheme and elevation cross-section of related locations



Three Stages of Expansion and One Major Improvement

Initially, the annual quantity of water supplied to Hong Kong under the Dongjiang-Shenzhen Water Supply Scheme was 68.2 million cubic metres. In order to meet the increasing water, the Scheme was expanded on three occasions from the 1970s to the 1990s, and was comprehensively improved in the early 2000s, collectively known as the "Three Expansions and One Improvement", which increased the annual water supply ceiling to the current level of 820 million cubic metres.

In terms of infrastructure investment to ensure water quality, the construction of dedicated aqueduct has improved water quality caused by the industrial activities of cities along the supply route. All infrastructure facilities were designed, funded and constructed by the Guangdong Province. It is well demonstrated that the Guangdong Provincial authorities had made tremendous investment and attached great importance to safeguarding the water quality of Dongjiang.

Dongjiang-Shenzhen Water Supply Scheme First Stage of Expansion



Works including extension of water supply canals, channels and pumping stations.

Dongjiang-Shenzhen Water Supply Scheme Third Stage of Expansion



Works including upgrading of pumping stations at Dongjiang, Shima, Matan, Zhutang and Shaling, etc and expansion of artificial channels and natural rivers.

Dongjiang-Shenzhen Water Supply Scheme Second Stage of Expansion



Works including construction of a new pumping station at Dongjiang and the raising of the Shenzhen Reservoir Dam.

Improvement works for the Dongjiang-Shenzhen Water Supply Scheme



In order to reduce the risks of contamination of Dongjiang water during delivery to Hong Kong, the Guangdong Provincial Government relocated the intake point of Dongjiang water upstream to a location of better water quality.

More information on the Water Supplies Department is available at the online Water Supplies Department :

<https://wsd.gov.hk/en/redirectlink/dongjiang>



24-hour Customer Services Hotline
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