Topic 2- Milestones of Hong Kong Water Supply (Key Stage 2)

English voice over script and super:

Super: Topic 2 Milestones of Hong Kong Water Supply Key Stage 2

FVO: Topic 2 Milestones of Hong Kong Water Supply Key Stage 2

Boy: Grandma, you always save the water after washing vegetables for watering plants. Why do you have to be so thrifty? We are not in any water crisis right now. We've got more than enough water to use.

Grandma: I have got used to this practice for more than 10 years. Every drop of fresh water is very precious, sweetheart. We have to make good use of it and conserve it. Thinking back to the water rationing implemented in the 60s, I was much more sparing than I am now!

Super:
Water rationing?

Boy: Water rationing?

Super:
Early 1980s
Geographical constraints

Water Save Dave: Yes. It's not a breezy task to maintain a stable water supply in Hong Kong. In the early 1980s, the problem of water shortage was serious because of geographical constraints, unreliable precipitation and the rising demands of water associated with rapid population growth. Therefore, implementation of water rationing to control and restrict water supply was quite common in the history of Hong Kong. There were always different challenges to be faced along the way.

Boy: What kinds of challenges? And are there any ways to overcome them?

Water Save Dave: To answer that, we'd have to trace back to the first time that the Government allocated funds for digging wells. Before there were any public water supplying services in Hong Kong, a lot of citizens used water from wells or streams.

When the population grew and grew, it became impossible for these water sources to satisfy the demands for fresh water in Hong Kong. Therefore in 1851, the Government decided to dig 5 wells to provide water to the public for free, which was the start of Hong Kong's history of water supply.

Boy: But...5 wells isn't a lot, is it?

Super:
Pok Fu Lam valley
Pok Fu Lam Reservoir
1863
Pok Fu Lam Reservoir

Water Save Dave: Of course, that is not enough! In addition, between 1841 and 1861, the population grew over tenfold! To cope with the rapid population growth, the Government needed to exploit new water resources. Therefore, in 1859, the Government decided to build a reservoir in the Pok Fu Lam valley to collect rainwater. After 3 years of construction, the first impounding reservoir in Hong Kong-- the Pok Fu Lam Reservoir was born, and it started to supply fresh water in 1863. Because the original reservoir had a small capacity, it faced the need of expansion shortly after being in operation. After the expansion project, it became the Pok Fu Lam Reservoir we see today.

Super:
"Tai Tam Valley Scheme"
Initiated in 1883
Completed in 1888
Filter tank
Filtered water

Water Save Dave: With the success of the first reservoir, the Government promptly commenced the construction of the Tai Tam Reservoir to cater for the increasing needs of fresh water in Hong Kong which is named the Tai Tam Valley Scheme. The project was initiated in 1883 and completed in 1888, the storage capacity was 4 times the capacity of the Pok Fu Lam Reservoir. Besides the reservoir, a filter tank was also built, and it was the first time that filtered water was supplied in Hong Kong. After the completion of the Tai Tam Valley Scheme and its expansion, it became the Tai Tam Reservoirs we see today. It was such a massive project at the time.

Boy: So then... was the water supply problem in Hong Kong solved?

Super:
Report
Chadwick
Poor sanitary conditions
Insufficient water supply

Water Save Dave: There's still a long way to go. In a report by a British engineer, Osbert Chadwick, he stated that the overall health condition of Hong Kong people was deteriorating because of poor sanitary conditions and insufficient water supply. Shortage of water and contamination of the drinking water had become a common issue. When the sanitary conditions are poor and water supply is not enough, there will be a perfect environment for epidemics to be spread. Unfortunately, that was exactly what happened to Hong Kong in those days.

Grandma: I heard my parents talk about that too! That was a highly infectious disease, and if treatment was delayed, the victim would die easily. Within just two years, between 1894 and 1896, the plague took lives of thousands of people in Hong Kong!

Super:
1902
Installing water meters
User pays

Water Save Dave: Yes, to solve the problem of water supply and to obviate this tragedy from happening again, Chadwick produced another report in 1902 which suggested installing water meters in Hong Kong and enforcing the "user pays" principle, implying that the user would pay according to how much water is consumed. The aim was to minimise water-wasting habits among citizens.

Boy: I see. That's how our metering system was set up. So was the water supply situation stabilised then?

Super:
1929

Water Save Dave: Not really. In 1929, there was a serious drought in Hong Kong with

record-low rainfall. Most reservoirs dried up during that time.

Grandma: That happened when my parents were still young. They told me about the drought they had experienced in the past.

Super:
Water Rationing
Kowloon
Hong Kong Island
Hong Kong
Shanghai
Japan
Zhuhai

Water Save Dave: I believe this should be the drought they were talking about. The Government implemented a lot of emergency measures such as water rationing, using water boats to convey fresh water from Kowloon to Hong Kong Island, importing water from other regions like Shanghai, Japan and Zhuhai, in the hopes of alleviating the serious water shortage problem. The drought impressed upon Hong Kong people the importance of water for human life, the Government also had to think about more long-term solutions to address the water shortage problem.

Boy: So, what were the plans that the Government made?

Super:
Hong Kong Island
Kowloon
Cross-harbour pipeline
1922
1930

Water Save Dave: Since the water resources on Hong Kong Island had already been fully exhausted, it was necessary to look for supply from the other side of the harbour. One of the plans the Government made was to connect Hong Kong and Kowloon by a cross-harbour pipeline in order to relieve the water shortages on Hong Kong Island. In fact, this idea was discussed as early as 1922, , and it was finally implemented in 1930.

Super:
1932
Shing Mun Reservoir

Water Save Dave: Meanwhile, the Government continued building reservoirs, such as the completion of the Shing Mun Reservoir in 1932. Do you know what other reservoirs there are in Hong Kong?

Super:
Plover Cove Reservoir
Largest area
First “reservoir in the sea”
High Island Reservoir
Largest capacity
Built in the sea

Boy: I know! There are other reservoirs like the Plover Cove Reservoir and the High Island Reservoir. The Plover Cove Reservoir is not just the reservoir with the largest area in Hong Kong, but it is also the first “reservoir in the sea” in the World. As for the High Island Reservoir, it is the reservoir with the largest capacity in Hong Kong, and is also built in the sea, like the Plover Cove Reservoir. Plus, it is the last reservoir that has been built by the Government up to this day.

Super:
Water Gathering Ground
Impounding Reservoir
Shek Lei Pui Reservoir
Tai Lam Chung Reservoir
Shek Pik Reservoir
17 in total

Water Save Dave: Impressive! Apart from the reservoirs in Pok Fu Lam, Tai Tam and Shing Mun that I just mentioned, and the two examples you gave, there are also reservoirs built in Kam Shan, Tai Lam, Lantau Island etc., such as the Shek Lei Pui Reservoir, Tai Lam Chung Reservoir and Shek Pik Reservoir. In total, there are 17 reservoirs all over Kowloon, Hong Kong Island and the New Territories.

Boy: So besides constructing pipelines and reservoirs, are there any other measures to prevent water shortages?

Water Save Dave: Absolutely. There is also seawater for flushing.

Grandma: Oh yes. In the old days we used dry closets which were stinky and inconvenient. It is much better after the flush toilet was introduced. We even replace the fresh water for flushing with seawater afterwards, that way we can use less fresh water!

Super:
1950s
Water shortage
1957
Densely populated resettlement areas

Water Save Dave: Yes, dry closets are not a good choice if we consider the modern standards of hygiene. That's why the Government encouraged the use of water closets in the 1950s, but that wide adoption of the water closets elevated the problem of water shortage. To save more water, the Government took advantage of the peninsular geography of Hong Kong and implemented seawater flushing in 1957. The scheme started in densely populated resettlement areas such as Shek Kip Mei and Lee Cheng Uk, where the Government installed seawater flushing systems. It was quite an innovative solution at the time.

Water Save Dave: Also, to avoid the sole reliance on the erratic rainfall for water supply, the Hong Kong Government began importing water from mainland China.

Boy: Imported water from China? That must be Dongjiang water!

Super:
November 1960
22700000m^3

Water Save Dave: You're right. In November 1960, the Government reached an agreement with the Governments of Guangdong Province on importing about 22.7 million cubic metres of water to Hong Kong annually.

Boy: 22.7 million cubic metres? How much is that?

Water Save Dave: That's about the amount of water more than 9000 standard swimming pools can hold.

Boy: Wow, that's a lot! If we have such a huge supply of fresh water from Dongjiang, why there water rationing in the 60s?

Super:
Shenzhen Reservoir
Hong Kong
1963
Dongjiang-Shenzhen Water Supply Scheme

Water Save Dave: To fully supply that amount of water to Hong Kong, Dongjiang water has to be conveyed to Shenzhen Reservoir, then supplied to Hong Kong. After several rounds of negotiation, consensus finally made in 1963 on the Dongjiang-Shenzhen Water Supply Scheme. Since the construction took a long time to complete, Hong Kong was hit by another severe drought before the water supply infrastructure was established.

Boy: How was the drought this time?

Super:
May 1962- April 1963
2 May 1963

Water Save Dave: From May 1962 to April 1963, the recorded rainfall was substantially less than the average annual rainfall, and the storage levels of Hong Kong's reservoirs dropped to barely over half of their total storage capacity. Therefore, the Government was forced to exercise water rationing from the 2 May 1963. Grandma, you must remember clearly how it was during that disaster.

Super:
3 hours every day
4 hours on alternate days
4 hours every 4 days

Grandma: Of course, I do. At first it was 3 hours of water supply every day, then it changed to 4 hours on alternate days, then the water supply was even lowered to 4 hours every 4 days afterwards. Meanwhile, cholera broke out and a lot of people got sick!

Boy: Oh dear! That is such an unimaginable situation nowadays.

Grandma: Everyone would remember the daily schedule of water supply and line up behind the standpipe for water a few hours earlier. And you can see hundreds of all sorts of containers, like buckets, metal cans, boiling pots, even vases and spittoons. Everyone in the family helped, both old and young, in order to get more water back home. Every drop counted, so everyone tried to make good use of every bit of the water collected.

Boy: Grandma, how did you save water in those days?

Grandma: You always sleep till late in the morning, just like an emperor. In those days, all of my siblings and I had to wake up much earlier. That's because there was only one basin of water used for brushing teeth and washing faces, and we had to take turns doing that. No one wants to use second-hand or third-hand water to wash their face! We also have careful steps to use a basin of water. First, it is used for washing rice; the water is then used for washing vegetables. We usually added some salt into the water to let the pests float to the surface, so the vegetables don't have to be washed twice. The remaining water can be used to clean windows.

Boy: Wow, you really cherish every drop of it!

Grandma: Of course. I recall seeing a person watering his flowers with fresh water. That person was fined hundreds of dollars for that!

Water Save Dave: Yes! In addition to water rationing, the Government also enacted laws to fine people for wasting precious drinking water. Serious cases may also lead to imprisonment! After this drought, the Government had also been actively researching in desalination, hoping to develop new water resources.

Boy: Desalination?

Super:
Seawater
Fresh water
1975

Water Save Dave: Desalination means converting non-potable, highly salty seawater into fresh water. In 1975, the Lok On Pai Desalter came into operation, and it was the largest desalination plant in the world at that time.

Boy: Sounds awesome! There's an abundant amount of seawater in the world, I guess Hong Kong would not have to face water shortages anymore.

Super:
Seawater resources
Diesel
Seawater
Intermittently to augment supply under the water shortage
Low usage rate

Water Save Dave: Even though seawater is abundant, the cost for desalination was high and it was not sustainable because the technology of desalination at the time drew energy from burning diesel to distill the seawater. Therefore, it was only used intermittently to augment supply under the water shortage and the usage of the plant was low. The situation worsened towards the early 1980s due to the oil crisis, the Government finally closed down the Desalter in 1982.

Boy: What a pity, it's just used for a short time only!

Super:
1977
Serious drought

Water Save Dave: Even though the Lok On Pai Desalter only lived a short life, but it timely alleviated the impacts of the serious drought in 1977. It is not entirely without contribution.

Boy: That's better. What other water resources did the Government try to develop besides desalination?

Super:
Reclaimed water

Grandma: I think reclaimed water should be one, right?

Boy: Reclaimed water? What is that?

Super:
Reclaimed water
Highly treated waste water
clear in appearance
odourless
Reclaimed water
Pollution to the environment
Burden on the ecosystem
Sustainable development
Environmental protection

Water Save Dave: You're absolutely right, Grandma. Reclaimed water is highly treated waste water which is clear in appearance, odourless and is safe for non-potable uses. Reclaimed water can be widely used including for street cleansing, car washing and landscape irrigation. Reclaimed water can effectively reduce pollution to the environment and the burden on the ecosystem, also relieve the demand on fresh water resource. And it is a big step towards sustainable development and environmental protection.

Super:
Reclaimed water
Northeastern part of the New Territories
Sheung Shui
Fanling
2022
Save 21000000 m^3
8400

Water Save Dave: At the moment, the Government continues their works to supply reclaimed water, converted from tertiary treated sewage effluent at the Shek Wu Hui Sewage Treatment Works, to the Northeastern part of the New Territories for non-

potable uses starting with Sheung Shui and Fanling from 2022 onwards. The supply of reclaimed water is estimated to save Hong Kong about 21 million cubic metres of fresh water each year, which is equivalent to 8400 standard swimming pools of water!

Boy: I didn't know reclaimed water is so beneficial and can be used in so many ways!

Super:
Demand
Total Water Management Strategy
Reclaimed water

Water Save Dave: The truth is, facing multiple challenges such as climate change, rapid population and economic growth, and water resource competitions in the Pearl River Delta region, WSD is committed to the implementation of the Total Water Management Strategy to ensure water security. Reclaimed water is just one of the many water resources the WSD is developing.

Boy: Total Water Management... I've heard of it before, but what exactly is it?

Super:
2008
Total Water Management Strategy
Supply Demand
Economy Environment Society
Promoting water conservation
Exploiting new water resources

Water Save Dave: In 2008, the Government promulgated the Total Water Management Strategy, which aims to achieve a balanced supply and demand of water to ensure water security and support sustainable development in Hong Kong. This strategy can better prepare Hong Kong for uncertainties such as acute weather changes and low rainfall. The emphasis of the strategy is to promote water conservation and exploit new water resources.

Boy: How is that done?

Super:
Water demand management

Water Save Dave: First, it is water demand management. That includes enhancing public education on water conservation, advocating the use of water-saving devices, maintaining and replacing aged water mains, establishing the Water Intelligent Network to reduce water mains leakages with new technology, and expanding the use of seawater for toilet flushing. WSD seeks to contain the growing water demand and to reduce water consumption.

Boy: Seawater for flushing... should be the system in the 50s we were talking about.

Water Save Dave: It sure is. When that plan slowly became successful, the Government gradually extended the use of seawater for flushing to different areas in Hong Kong. Up to this day, Hong Kong is one of the few places in the world that is widely using seawater for flushing.

Boy: Is it used in the entire Hong Kong?

Super:
2015
Tuen Mun
Yuen Long
Tin Shui Wai
85%
The Peak
Sai Kung
Outlying Islands
North District
Distant from the coast or located in high altitudes
90%
More fresh water can be saved

Water Save Dave: Following the establishment of seawater supply system in Northwest New Territories in 2015, such as in Tuen Mun West, Yuen Long and Tin Shui Wai, the seawater supply coverage has been expanded to 85% of the Hong Kong population. At present, the only places that aren’t using seawater for flushing include The Peak, Sai Kung, the Outlying Islands and the North District, which are all distant from the coast or located in high altitudes, the cost of installation of a seawater supply system is high and uneconomical. Even though these areas are still using fresh water for toilet flushing, the Government is progressively introducing reclaimed water for

flushing in Northeast New Territories. If the reclaimed water supply system is fully established, it can jointly benefit 90% of the Hong Kong population with the seawater supply system to replace fresh water for toilet flushing. Then more fresh water can be saved.

Boy: That's great! You said "first" is water demand management, then what's "second"?

Super:
Water supply management
Exploiting new water resources
Reclaimed water
Desalination
Grey water recycling
Rainwater harvesting

Water Save Dave: Second, it is water supply management. Apart from protecting water resources, WSD is actively exploiting new water resources other than local yield, Dongjiang water and seawater for flushing. There is reclaimed water and desalination which I've just told you, but there is also grey water recycling and rainwater harvesting.

Boy: Wait a minute... I thought you said we stopped desalinating seawater because of the high cost. Why does the Government still research on it then?

Super:
Reverse osmosis

Water Save Dave: Now that technology is more advanced, we found a cheaper and more sustainable way to desalinate seawater, which is reverse osmosis!

Boy: That sounds complicated. What is reverse osmosis?

Super:
Reverse osmosis
Semi-permeable membrane
Reverse osmosis
Tseung Kwan O

Water Save Dave: Simply speaking, reverse osmosis is to apply excessive pressure to force water from the seawater with lower water potential to the fresh water side which is of higher water potential. The semi-permeable membrane between them only allows fresh water to pass through, salt and other impurities would be left behind. By using a semi-permeable membrane to filter away the salt in seawater, the cost is much lower than the distillation process used in the past. Most desalination plants in the world tend to adopt this method instead. The Government is now planning to build a new desalination plant in Tseung Kwan O.

Boy: I understand now. What is grey water then?

Super:
Grey water

Water Save Dave: Grey water is the wastewater collected from showers, water basins, sinks, and washing machines etc. Grey water and harvested rainwater can be used for non-potable purposes after being treated such as irrigation and toilet flushing.

Super:
Water Supplies Department
Government construction projects
Private buildings
Centralised grey water recycling system
Anderson Road Quarry development site

Water Save Dave: WSD is promoting the use of grey water recycling system and rainwater harvesting in certain Government construction projects and private buildings, to lower the use of fresh water for non-potable purposes. Furthermore, WSD is planning to construct a centralised grey water recycling system at the Anderson Road Quarry development site, to treat grey water collected from inhabitants for flushing use.

Boy: Wow, WSD is really putting in tremendous effort in promoting water conservation and exploiting new water resources!

Water Save Dave: Not only that, WSD is also introducing new technology in reservoirs to develop renewable energy.

Boy: What new tech?

Super:
Solar panels for electricity generation
Renewable energy
Evaporation rates of water
Growth of algae
Land resources
Efficiency of electricity generation

Water Save Dave: One of the new technologies introduced is placing solar panels on the surface of reservoirs to collect solar energy for electricity generation. It also has other benefits like reducing evaporation rates of water, restricting the growth of algae, saving invaluable land resources and maximising the efficiency of electricity generation of solar panels.

Boy: After hearing so much about the history of the water supply in Hong Kong and the development of water technology, I really feel that clean water is precious and is the fountain of life. It's because of a lot of people's hard work that we can get clean fresh water to use nowadays.

Grandma: Yes, so even though we get plentiful water resources to use now, we should not waste any more water. Water-saving habits must be cultivated from a young age, sweetheart. In those days, water rationing was common, and now we get water 24 hours a day, it's just like a gift from heaven. How can we not cherish a heavenly gift?

Boy: Yes, I will. I will learn to be like you, Grandma, and to treasure every drop of fresh water I have.

Grandma & Water Save Dave: That's my boy!