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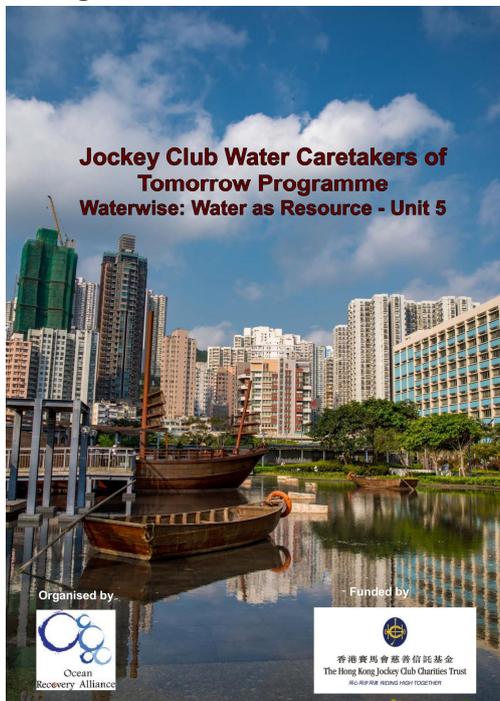
香港賽馬會慈善信託基金
The Hong Kong Jockey Club Charities Trust
同心同步同進 RIDING HIGH TOGETHER

Teacher Notes for Unit 5: Water as Resource

About the Jockey Club Water Caretakers of Tomorrow Programme:

The Jockey Club Water Caretakers of Tomorrow Programme is a collaboration funded by The Hong Kong Jockey Club Charities Trust and developed by Ocean Recovery Alliance, Ltd. It is an educational curriculum programme designed for students in Form 1-3 early secondary school in Hong Kong. Through a combination of both inquiry-based and project-based learning, students develop understanding and appreciation for our water systems and functions, at both the local and global levels. They learn how to assess threats such as pollution and habitat destruction, while also developing ways to mitigate them. This understanding will empower our youth to take an active role as caretakers of our water resources of the future, and to share their commitment with their families and communities.

Using the Lessons in the Classroom



The Water Caretakers Project consists of eight units. The units have been developed to allow for using as many as your time and your curriculum will allow. Each unit can stand alone, although it is strongly recommended that Unit 1: Miraculous Water, be implemented first as it lays the groundwork for the other units. Please note that there is repetition in some of the topics covered in each of the units. This is intentional. As it is likely that most teachers will not be able to complete all of the eight units, the curriculum has been designed to contain as many of the important concepts as possible, within each unit. Teachers are encouraged to pick and choose from the range of topics and activities in each unit, such that unnecessary repetition is avoided.

Teacher Notes and Student Notes

Each unit consists of Teacher Notes and Student Notes. The Teacher Notes include information about skills accessed, materials needed, recommended assessments, suggested extensions, cross-curricular links and other information that could help determine how the Unit and the individual lessons might fit into a teacher's curriculum. In addition to this, Teacher Notes will contain links to websites with background material that can deepen the teacher's understanding on the topics covered in the unit.

The Student Notes can be printed out for the students to use throughout the unit. It includes background information, instructions for all the activities, as well as space to record their learning. The students should also have access to the Student Notes online as many of the activities and additional information are linked to websites on the internet.

It is also recommended that students keep their own "learning log" or journal to record their progress in understanding the issues as well as the actions they might take.

Extensions

All the lessons contain "Extensions" which provide additional rigor or challenges for students. These suggestions for enrichment can help to streamline the lessons to the grade level, curricular or differentiation needs of your own students. Some of the extensions utilize case studies or contain more photographic material or recommended websites, all of which might be suited to students with different learning styles.

Safety in the Classroom and in the Field

Teachers will go over their school's rules for safe and responsible behaviour both inside and outside the classroom, before doing all of the activities in the units. The Teacher Notes will, however, identify particular safety concerns to be aware of in specific activities.

Student Action and Social Responsibility

The aim of every unit in this project is to build student understanding of water resource issues. Through that understanding, it is hoped that they will be motivated to work toward positive change individually, locally and globally. It is, however, important that their teachers communicate the importance of their being sensitive to the complexities of cultural norms and political processes.

Objectives of Unit 5: Water as Resource - Waterwise

At the end of the lessons in this unit, students will be able to:

- Identify the sources of clean water on Earth
- Manage multiple uses for a limited renewable resource
- Explain how we maintain clean water
- Anticipate the consequences of changes to the water supply
- Develop a plan for responsible personal use of water
- Participate in a community effort to use water responsibly

Student skills table

Lesson	Critical thinking	Supporting Opinions with evidence	Applying scientific principles	Data collection	Graphing and Data Analysis	Reading for Understanding	Using technologies for mapping	Research and/or Presentation
1								
2								
3								
4								

Cross-curricular Links:

Lesson 1: *Humanities/Geography* (identifying water use), *Language Arts* (composing Haikus), *Physical Science* (Extension activity about hydropower)

Lesson 2: *Science/Mathematics* (data presentation with graphs, predicting percentage of freshwater) *Science/Mathematics* (analysing graphs), *Physical Science* (constructing a water filter), *History/Geography* (identifying issues with use of bottled water, case study of water use in Myanmar), *Music* (tap water rap)

Lesson 3: *Humanities* (international water rights, water conservation), *Mathematics* (calculating total water loss from dripping faucet)

Lesson 4: *Humanities/Civics* (looking at role of government agencies in protecting water resources, global water issues presentation), *Art* (postcard about water use)

Unit Vocabulary - refer to Student Notes

Student Notes includes all the vocabulary and definitions that the students should know in order to understand the topics covered.

Materials and Technology Needed

Activity						
Lesson	1	2	3	4	5	6
1	Access to internet	Access to internet		Access to internet	Access to internet	
2	Access to internet 1 litre container, Graduated cylinder, 2 beakers Small dish, Dropper	Plastic bottle with bottom cut out, Flask that can hold upside down plastic bottle Gravel Charcoal Sand Water mixed with soil	Access to internet	Access to internet	Access to internet	Access to powerpoint - "A Changing River"
3	Access to internet	Access to internet	Access to internet			
4	Access to internet					

Unit Introduction:

- 1- Go over the Student Aims and the Vocabulary with the students.
- 2- Students access prior learning by completing an activity on the internet in which they match an item with the amount of water needed to produce it. Discuss which items surprised them the most.

Lesson 1: How We Use It

Objectives: In this lesson, students will understand:

- The many uses of water
- The need to conserve water
- Where Hong Kong gets its water from

Activity 1: How We Use It

Students describe how water is used in the photographs. For some of the photographs, there are links with information about how some of the products are made.

Activity 2: Bruce Lee says “Be as water, my friend”

After watching the video of Bruce Lee, discuss what makes water so special. Students learn about how to make a haiku. They write three haikus that deal with the special qualities of water. They can also make illustrations to go with each haiku.

Activity 3: A Limited Renewable Resource

Review the water cycle with the students. Discuss what is meant by water “running out”. Why do we need to conserve water if water is constantly cycled on the planet? Students should understand that there are limited supplies of freshwater, that water that is polluted can be very costly and time-consuming to clean, and finally, even though water does cycle continuously through the system, it takes a long time for freshwater to be easily available again.

Activity 4: Hong Kong Water Supply

- 1- Students learn about Hong Kong’s water supply from the websites and answer the questions.
- 2- They make a bar graph or pie chart to display the information about reservoirs in Hong Kong.

Activity 5: Water Isn’t Cheap

Students learn about the issues involved in meeting Hong Kong’s water supply needs from Dongjiang in China.

Extension: Students can learn about how hydropower works or they can explore the environmental impacts of large dams such as the Aswan or Three Gorges dam.

Lesson 2: The Where and the How!

Objectives: In this lesson, students will understand:

- How much available freshwater there is on the planet, relative to other water
- How water is treated
- Issues associated with use of bottled water

- How water use changes through time

Activity 1: Water, Water Everywhere

Students follow the prompts for the activity about the percentage of freshwater on Earth. The website referenced contains a detailed breakdown on where all of the Earth's water is located.

Activity 2: Filtering Water

Students follow the instructions to build a water filter from a plastic bottle. After this is completed, discuss what other characteristics of the water might need to be cleaned? How might this be accomplished?

Activity 3: Water Treatment in Hong Kong

Students learn about the steps in water treatment by watching the video and reading the prompts.

Activity 4: Water Monitoring in Hong Kong

1- Students learn about how Hong Kong ensures that our drinking water is safe.
2- They produce a pamphlet explaining why and how Hong Kong's water is safe to drink. This will hopefully help to cut down on the unnecessary use of bottled water in a city that has clean tap water.

Activity 5: Bottled Water

1- Students read the online articles about the issues surrounding the use of bottled water.
2- Hold a class discussion about the arguments for and against the use of bottled water.
3- Put students into groups of three or four and have them make a Tap Water Rap final verse, after watching the rap online.

Activity 6: Water Use in Myanmar - Then and Now

By using the case study of Myanmar, students learn about the changes in our use of rivers, as well as the changes in water quality through time. Students follow the prompts after they download the powerpoint which is found in the "additional resources" for this unit.

Lesson 3: Water Conservation and Management

Objectives: In this lesson students will understand

- **Some of the complex issues that govern water use between countries**
- **How water is wasted and how it can be conserved**
- **How much water we use at home and at school and how to manage this use**
- **Historical water management (Extension)**

Activity 1: International Water Dilemma

1- Students read some examples of future water use problems on the website indicated.

- 2- As a class, fill out the table about Country A and Country B water rights.
- 3- Decide as a class about which factors to consider when countries negotiate about water rights. The following ideas might be considered:
 - If it passes through country, the country has the right to take what it wants
 - Countries lower down have the right to get the same amount of water in the past
 - It can only be resolved by fair negotiations.
- 4- Read about what the United Nations says about people's right to water.

Activity 2: What a Waste

- 1- Students fill out the chart.
- 2- They list ways that people in Hong Kong might wastewater.
- 3- Finally they follow the prompts for the experiment about how much water is wasted from dripping faucets.

Activity 3: Let's Find Out: School and Home Audit

- 1- Divide the school up among the students. Have them look at all the school's plumbing. Students may need to get permission to enter staff rooms and the cleaners' rooms.
- 2- Students follow the prompts to estimate home water use per person. They will need to estimate the water used for each of the activities in the table. They also need to add more activities to the table and estimate the amounts used for those.
- 3- The class data can be added together and averaged. Then compare it to the pie graph on the website cited.
- 4- Alternatively, the students can do an audit of water wasted in their home.

This chart should be used and compared with the students' estimates:

Use this chart to help you calculate how much water your home uses in 24 hours.

Water use	Number of litres used
Toilet flush	7.5 litre
Brushing teeth, washing hands etc in basin	6 litres a minute if tap is left running
Shower	10 litres a minute
Allowing kitchen tap to run	10 litres per minute
Filling kitchen basin	About 10 litres
Washing machine	Up to 55 litre new machines and 100 litres for older machines

Bath	About 85 litres
Shaving legs	About 10 litres a minute

Activity 4: We Can Help Fix It At School and Home

Students can choose from the suggestions about how to use less water at school and/or at home.

Lesson 4: Everyone Needs to Help

Objectives: In this lesson, students will understand

- **The government’s role in protecting water resources**
- **The community’s role in protecting water resources**
- **Local and global issues on water use**
- **Ways to influence understanding and behavior regarding water use, at the local level**

Activity 1: Research

Students follow the prompts to research the role of government and communities in protecting our water resources

Activity 2: Reporting Back

Students report on their findings in the presentation format of their choice.

Activity 3: Looking Forward

Students make a postcard with a simple message about using water better. They can give it someone they know or the class can have a display of all the postcards.