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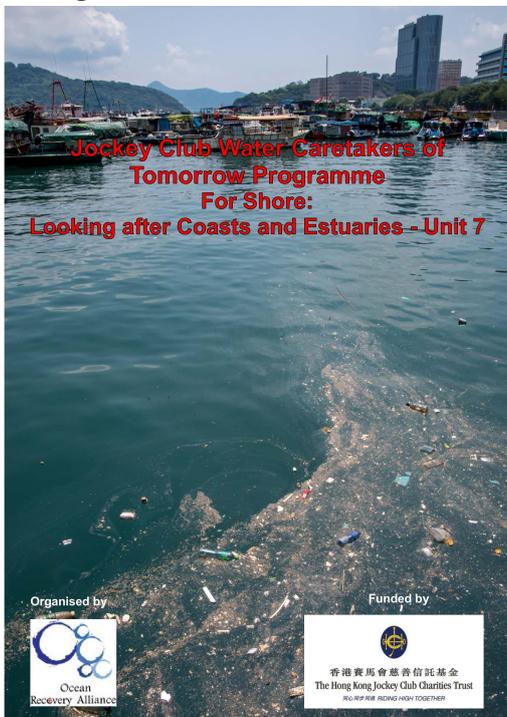
香港賽馬會慈善信託基金  
The Hong Kong Jockey Club Charities Trust  
同心同步同進 RIDING HIGH TOGETHER

## Teacher Notes for Unit 7: For Shore - Looking after Coasts and Estuaries

### 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.



**Cross-curricular Links:**

**Lesson 1:** *Biology/Ecology* (organisms adapted to life on coast) *Geography* (human impacts on the coast)

**Lesson 2:** *Geography* (Coastal Geomorphology, coastal landforms and their use), *Design* (models of coastal processes)

**Lesson 3:** *Humanities/Art* (uses of the coast, indigenous people, fish in art, in different cultures) *Human Geography* (populations along coasts), *Ecology* (seagrass foodweb)

**Lesson 4:** *Geography* (coastal protection), *Design* (designing an artificial reef)

**Lesson 5:** *Humanities* (balancing uses), *Science/Mathematics* (coastal excursion, data analysis), *Humanities* (community project)

**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	Teacher needs access to soundtrack on internet for Prior Knowledge activity.  Access to internet	Access to internet	Access to internet		Access to internet	
2	Modeling clay, trays, blunt knives, camera	Powerpoint in Resources section  Drawing materials				
3			Access to internet, drawing materials	Access to internet	Access to internet	
4	Access to internet					Materials for designing a reef -- depends on their model requirements
5	Access to internet	For the coastal excursion, materials will depend on what the students decide to investigate. See Unit 4 Lesson 3 for ideas		For the community projects, apart from access to internet, materials will depend on what the students decide to do		

## **Unit Introduction:**

- 1- Go over the Student Aims and the Vocabulary with the students.
- 2- Play the seaside sounds soundtrack: <http://en.ecosounds.net/sea/beach-sounds-calming-waves-music-and-happy-people/>
- 3- Students respond to the prompts. They should be able to consider some of the things that may affect the peace and beauty of a scene at the beach.

## **Lesson 1: Coastal Habitats and Uses**

**Objectives:** In this lesson, students will understand:

- Features and benefits of different coastal habitats
- How coastal habitats are modified by people and by nature
- Some of the features of organisms adapted to a coastal habitat

### Activity 1: Habitat and uses

- 1- Students describe the main features they can see in each photo.
- 2- They describe what they know about the habitat and the wildlife that uses the habitat
- 3- They describe how we use these places
- 4- Divide the class into small groups so each group has one or more habitat to research and they add to what they knew.
- 5- After completing the research each group shares what they have learned and the class completes the worksheet

### Activity 2: Google maps habitats

- 1- Review what the class understands about longitude and latitude.
- 2- Students follow the prompts to locate a coastal habitat and describe it in the table after noting down the coordinates.

### Activity 3: Natural coastal habitats have many benefits

- 1- Students read the short list of benefits from different natural coastal habitats
- 2- They use a location they found in Activity 2 or find a new one in Hong Kong.
- 3- They put captions on google images that illustrate a couple of the benefits of these habitats

### Activity 4: Habitat destruction - pick your disaster

Students gain an appreciation of environmental impacts on the coast by linking photographs in the table to human activities.

### Activity 5: Welcome to my home

Students choose an animal that lives along the coast and research it well enough to be able to answer the questions in the boxes.

## **Lesson 2: Coastal Geomorphology**

**Objectives: In this lesson, students will understand:**

- How coastal landscapes change
- Characteristics of different coastal landforms
- Uses of coastal landforms

### Activity 1: A changing coastal environment

Put students in groups that will each build a clay model of a particular feature of coastal geomorphology.

They follow the prompts in the activity.

### Activity 2: Coastal landforms and their use

1- Students access the powerpoint “Coastal Landforms” in the Resources section and answer the questions on the slides, in their notebooks.

2- At the conclusion of the powerpoint ask students if any of the landforms:

- Only occur in tropical areas
- Only occur in cool areas
- Only occur if exposed to the open sea
- Can only occur in flat areas

Did any students know that coral cays are made from the broken up skeletons of coral?

3- Students can do the drawings of landforms or the warning sign as a concluding activity.

### Activity 3: How Much Development is Too Much Development?

Students watch a Powerpoint they can access in the Resources section. They are asked to consider the continually changing nature of our coastlines, and the development pressures they are under. Students are also prompted to think about the limits to development on the coast.

### **Lesson 3: Coasts: Who Needs Them?**

#### **Objectives: In this lesson students will understand:**

- Some of the effects of coastal development
- The complexity of balancing different uses for our coasts
- Why people like living near the coasts
- The global pattern of populations on coasts
- The cultural context of our connection to the coast

#### Activity 1: This is fun

Students look at the photos provided and jot down the answers to some questions which are meant to stimulate thinking about the different uses for our coastal environments.

#### Activity 2: World populations

Students interpret the two maps shown. They can also visit the website that they came from, if needed. They should get a sense for the connection between population and environmental impact to our coasts, on a global scale.

#### Activity 3: Indigenous peoples

- 1- Students read about an example of indigenous people in Australia.
- 2- They research an indigenous people of their choice and make a labelled diagram about how these people use the sea for food and cultural practices.

#### Activity 4: Spiritual meaning of the sea

Students are asked to consider another “use” of the coasts and the sea. They follow the prompts, looking for Google images related to “spiritual, sea” and think about this other, less tangible aspect of our connection with our coasts.

#### Activity 5: Feeding the World

Students read about fish consumption, watch a video about seafood sustainability in Hong Kong (made by a middle school student) and answer the questions.

#### **Extension**

If the class has previously covered concepts in Unit 4, including learning about food webs, students can research food webs in the sea to learn more about the interconnectedness of organisms in the sea. Then they can consider the effects of different methods of commercial fishing.

## Lesson 4: Our Changing Coasts

**Objectives: In this lesson, students will understand:**

- Coastal modifications by natural forces
- Adaptations by organisms that live on coasts
- Effects of coastal pollution
- How to mitigate some effects of man-made coastal modification

### Activity 1: Nature at work

- 1- Students consider the impacts of waves on the coast by looking at the photos and answering some questions.
- 2- They research two animals that live in the intertidal zone -- limpets and sea urchins.

### Activity 2: Land reclamation

Students look at a photo of an area in Hong Kong that has undergone considerable coastal modification. They are asked to analyse the changes to the land and the sea, as well as the possible effects of climate change and the costs and benefits of land reclamation.

### Activity 3: Dredging our ports - good or bad?

Students learn about why dredging is needed and what the environmental implications might be from this activity. Students are asked to weigh the pros and cons in a class discussion.

### Activity 4: Litter disaster

Students respond to the prompts associated with each photograph from Hong Kong, each of which deals with another aspect of litter or other pollution getting washed into the sea.

### Activity 5: Finding better solutions

- 1- Students learn about the role mangroves play in protecting our coasts.
- 2- They consider the relative merits of different forms of coastal protection.

### Activity 6: Design a reef

After looking at some examples of man-made structures that are used by wildlife, they come up with their own design for an artificial reef. This can either be a labelled diagram or a model.

## Lesson 5: Balancing Competing Interests

**Objectives: In this lesson, students will understand:**

- The need for addressing different uses of the coastal environment
- How our uses of the coast affect the marine environment
- Possible ways to reduce negative impacts to our coasts and marine environment
- Some of the local uses that compete in their own local, coastal environment

### Activity 1: Flash points

- 1- Divide students into groups interested in one of the coastal/marine issues listed. It is recommended that the groups are no larger than three students.
- 2- Students research the issue and come up with some recommendations for balancing the different uses.
- 3- The groups decide on how they will present their information, i.e. podcast, TV interview, report, slideshow, skit, etc.

### Activity 2: Plan a coastal excursion

Students follow the prompts for developing a plan for a field trip to the coast.

#### **Identify a location suitable for a coastal study**

The teacher will need to be familiar with a location beforehand.

It is often better to go to a location that has already suffered from high human impact as students under supervision and using their conservation code will have very little impact. Consider access to toilets.

Avoid coastal areas near stormwater drains after heavy rain.

There needs to be a plan B if on the day the waves are large and are crashing onto the rocks.

#### **Find out when the tides will be suitable**

Use tide charts on the internet to find an appropriate time to visit the coast.

Interpret the tide charts using different resources including tables, internet and newspapers.

#### **Find out if there are any conservation restrictions on using the location**

- Which government agency regulates fisheries?
- Which government agency regulates the conservation of sea life?
- Which government agency regulates marine parks?

#### **Develop a student safety plan while working on the coast**

This is not an exhaustive list and is only a suggestion to head your class in the right direction.

Involve teachers and students in identifying possible safety issues and solutions:

- Identify where students can and can't go when along the coast and how far out of the intertidal zones.
- How will students be protected from the sun? What kind of clothing must they wear? Eg students need to keep solid footwear on their feet at all times.
- How will students remain hydrated?
- What restrictions are required for handling animals? Which animals when handled are potentially dangerous in this location?
- How will students poke around safely? Eg use plastic rulers or even better, plastic spaghetti spoons to rummage through dead seaweed and around rocks and crevices.
- Probably students are most likely to come to harm when running, so walking carefully is essential.
- What first aid kit will be accompanying the excursion?
- When would an ambulance be called? If there is any chance that a student is placed in danger it is best to get an ambulance.

### **Develop a student conservation plan so you don't have an impact on the coast**

- What regulations restrict what students can do on the coast?
- What animals should never be removed from rocks because the animals will be injured?
- What animals should not be removed from the water?
- What restrictions will the class decide on about taking specimens back to school?
- How will students avoid crushing seaweed when walking around rocky platforms?
- What is a reasonable number of rocks to turn over to see what is underneath? Eg the class decides that turning over of rocks could be done in two groups with a teacher. Each group could look under five rocks making sure the rocks are returned to their exact position.
- What will students do with their rubbish?
- If students find any litter that might be dangerous eg syringes or broken glass, only an adult should ever remove it.

### **Decide what students will investigate**

When visiting the coast to do an investigation with what is the most effective way to use the time is as follows:

- When students arrive allocate enough time for students to explore freely and become fascinated.
- Students gather data with a biological focus.
- Students gather data with a conservation focus.
- There are many themes students can investigate in a coastal environment. Some suggested themes that can be modified are:
  - Describing how organisms are adapted to living in the intertidal zone.
  - Mapping how organisms are distributed in the intertidal zone.
  - Measuring the species biodiversity.
  - Describing the difference between organisms.
  - Comparing niches along the coast.
  - Comparing the diversity of living molluscs in a pools and rocky platforms with the dead empty shells on the beach.
  - Finding evidence of human impact.
  - Recording the type and density of litter that is found.
  - Comparing rocky areas where people walk and don't walk.
  - Record visitors' behaviour including what they allow their dogs to do.
  - Evaluating the signs on the beach if they are effective in encouraging safety and conservation.

After the above topics have been addressed,

- 1- They develop an investigation to gather and record data. Divide them into groups so that there are at least two investigations.
- 2- They gather the necessary equipment and allocate responsibility for its care.
- 3- Go over safety protocol before they start the investigations.
- 4- They gather data and analyze it back at school.

### Activity 3: Your Coastal Visit

In this activity the class produces a small booklet about the coastal visit.

Each group of students will have four A5 pages to fill in the book. This includes text, photos and illustrations.

Discuss as a class how you will produce a booklet about the coast, its physical environment and conservation.

Decide how many groups the class will be divided into. Discuss what themes each group could do without overlapping. Examples of themes are:

- Why it's a great experience to visit the coast
- Explaining how life for plants and animals in the intertidal zone is one of the most difficult on the planet.
- What is found in the intertidal zone
- Things washed up on the beach
- How people impact on the intertidal zone
- What people can do to protect the intertidal zone
- Staying safe when at the beach.

### Activity 4: Looking forward

There are many different community projects relating to coastal protection. Students can research about these existing projects and get involved with one of those suggested, or others. They can also design their own community project.