Case Study "Environmental change and management of the coastal environment"

Activity Sheet 9 "Strategies to clean up existing plastics in our oceans"

Introduction

In the next two activity sheets students explore the nature, purpose and effectiveness of specific measures to prevent and reduce the impacts of plastics in our waterways. These approaches have been placed into two broad categories, those being strategies to clean up the existing plastics in our waterways and strategies to reduce the amount of plastic waste and consequently the amount of plastics entering our waterways. Strategies at a global, national and local scale are investigated.

The content of this activity sheet relates to the following Geographical Concepts and Skills and Geographic Knowledge:

Geographic Concepts and Skills

Data and Information

- Collect and record relevant geographical data and information, using ethical protocols, from reliable and useful primary and secondary sources.

Geographic Knowledge

- Environmental, economic and technological factors that influence environmental change and human responses to its management.
- Environmental worldviews of people and their implications for environmental management.
- Application of environmental, economic and social criteria in evaluating management responses to an environmental change, and the predicted outcomes and further consequences of management responses on the environment and places, comparing Australia and at least one other country.

[United Nations resolution to combat plastic](#)

Research the above resolution and then answer the following questions

1. What pledges or targets were agreed to in the United Nations resolution? Why is this a step in the right direction?
2. According to articles, such as those listed below, what are the limitations of the agreements reached?
3. What impact do these limitations have on the short term efforts to reduce plastics in our waterways?

Some useful articles include

The Independent: [UN resolution calling for targets to tackle ocean plastic waste rejected](#)

BBC News: [UN commits to stop ocean plastic waste](#)

Reuters: [Nearly 200 nations promise to stop ocean waste.](#)

Cleaning up existing plastics in our oceans

Prior to commencing the tasks below, as a class discuss why it may be difficult to clean up existing areas plastics in our waterways, such as the ocean garbage patches. Points such as the following could be raised:

- Microplastics are difficult to collect and trap
- It is difficult to collect plastics that are submerged
- Whilst plastic litter is concentrated in ocean garbage patches, the case study on Port Phillip Bay clearly shows that plastic litter is distributed across the globe. Such a large area is difficult to manage.
- There are already large quantities of plastics in our waterways causing significant damage
- It is a global problem. It needs to be addressed at a global, national and local level.

Extension Activity

As an extension to this point and a follow up to the task on the United Nations resolution, ask students to quickly research what specific international governments are doing to clean up existing areas of plastics in international waterways, such as the Great Pacific Garbage Patch. It is likely that their research will find very little as the oceans garbage patches are in international waters and are not the responsibility of one particular country. Further, the required projects would require significant funding.

Given the above a range of solutions need to be implemented

The programs that have been implemented to clean up the existing plastics in our waterways tend to be those implemented by non-government organisations. The strategies adopted by such organisations are occurring at a range of scales and locations. There is a large amount of information available – below are just some of these resources to get you started.

1. One of the more recognised efforts to clean up the Great Pacific Garbage Patch is the prototype developed by a foundation called The Ocean Clean Up. Information about the foundation and their project can be obtained via their website.

Use the information contained on this site when completing the following tasks:

Watch the clip Boyan Slat- The New Picture of the Great Pacific Garbage Patch and answer the following questions: (You may have already watched this clip when looking at the characteristics of ocean garbage patches).

a. According to Boyan, what were the limitations of previous efforts to collect data about the Great Pacific Garbage Patch?

b. What was the initial strategy that Boyan implemented to gain more reliable data?

c. To obtain more specific data about the larger items in the Great Pacific Garbage Patch what methods and technologies were used?

d. What methods were used to classify the litter collected? How was this converted into useful data?

e. What were the results of this research? How did these results change the perception of the Great Pacific Garbage Patch?

f. Explain how the results place an even greater emphasis on the need to clean up the Great Pacific Garbage Patch.

Watch the clip Boyan Slat unveils The Ocean Cleanup Prototype and answer the following questions:

Note: An update of the prototype can be found on The Ocean Clean Up website and via clips such as The Ocean Cleanup's Most Advanced Scale Model Test to Date

a) What conventional methods are available to clean up the oceans? According to Boyan what are the limitations of these methods?

b) Describe the design of the prototype and explain how it will collect rubbish from our oceans.

c) When is it expected that this project will be fully operational? What does this date mean for the implementation of other strategies to limit the impact of plastics?

d) When the prototype is fully operational what are the expected outcomes?

e) There are articles, such as those listed below, which provide an insight into some of the problems/issues that the prototype could face.

- Great Pacific garbage patch sprawling with far more debris than thought
- Great Pacific Garbage Patch plastic removal system could become 'world's biggest piece of marine debris', critics say

Using the information above, as a class evaluate the effectiveness of this prototype. One method to do this is by completing a SWOT analysis as shown in the table below.

Strengths	Weaknesses
Opportunities	Threats

Based on the points raised in the SWOT analysis discuss whether you consider the prototype to be a viable method to reduce plastics in our waterways.

2. On a smaller scale other projects such as Seabins have been implemented. Watch the following clip Will Seabins save our oceans? The Seabin Project and read the Seabins to catch rubbish in Aussie waters as they provide useful information to help evaluate the effectiveness of this project. Then answer the following questions:

a. What are seabins and how do they operate?

b. What type of plastics/litter are collected by seabins?

c. Where are seabins generally located?

d. When is it planned that seabins will go offshore?

e. As a class evaluate the pros and cons of seabins.

3. Greater emphasis is being placed on trapping litter in the river systems before it reaches our seas. As an example of one of the river traps go to

"Bandalong Litter Trap - Products & Services - Water Pollution Solution"

A short clip to show this type of litter trap is "Trash Trap on the Yarra River "

Using the information from resources such as those listed above, answer the following questions:

a. Describe how the litter traps operate.

b. What are the advantages of these litter traps?

c. Do these litter traps collect all the forms of plastics in our waterway?

4. Across the globe there are numerous non profit organisations that clean up litter, including plastics, that have washed onto beaches. Apart from improving the health of the environment, removing litter found on the beaches simply means it will not re enter the water. Within Australia some of the organisations that undertake litter clean ups include:

- Tangaroa Blue
- Beach Patrol
- Sea Shepherd
- Ocean Watch
- Clean Up Australia
- Port Phillip Baykeeper
- The Litter Hotspots program

As an example of one of these organisations go to [Tangaroa Blue website](). Using the information contained under "Home" and "About Us" answer the following questions.

a. What are the broad aims and objectives of Tangaroa Blue?

b. How has Tangaroa Blue assisted in the removal of debris from beaches?

c. How much litter has been collected from beaches via Tangaroa Blue's programs?

d. Explain the purpose of the Australian Marine Debris Data Base. How does this data base operate?

e. As a result of the data collected what are some changes regarding the use of plastics that have occurred?

f. What other projects has Tangaroa Blue initiated? (these will be discussed in more detail in other tasks)

To provide a real life experience of the Australian Marine Debris Base you could go on to the site and organise a clean-up. Alternatively, you may choose to research a similar organisation that you have or would like to develop community ties with. If one of these organisations is close by you could consider inviting them to your class to provide an overview of their operations. You may also consider asking volunteers from your class to participate in one of their clean up days.