

Our Relationship with the Bay



Pre-Visit Activities

Prior to their visit students should have a basic understanding of the impacts humans can have on the environment and biodiversity and the importance of minimising and/or managing these problems. Have discussions on why they feel that it is important to protect the environment.

Activity 1: What is Biodiversity?

Biodiversity is short for biological diversity. It refers to the extensive variety of life on earth, encompassing everything from plants to animals to microorganisms, to the genes that they contain, and the ecosystems they form.

This activity is designed to introduce the concept of biodiversity, as well as highlight some fascinating facts about the marine world. Most of the earth's surface is covered by water, yet only about 10% of that has been explored. Considering what you have just found out - biodiversity in the ocean is huge. Yet though we have such great biodiversity in our waters, a large number of organisms have become extinct or are endangered. Unfortunately, we know so little about our oceans that we do not even know the extent of damage that we have caused.

This quiz probes the students' understanding of biodiversity. Divide the class into groups of three students. Hand each group a copy of the 'Marine Biodiversity Quiz' (Worksheet 1). Explain that they do not need to know all the answers, but should give each question a go - even it is only a guess. Once the students have completed the quiz go through the answers, and discuss some of the findings.

Ask the students to come up with a class definition of what biodiversity is. Then have each student come up with their own reasons as to why biodiversity is important and have them share their opinions with others.

Activity 2: Why should we care about biodiversity?

Why is it important to protect the biodiversity of Port Phillip Bay? What do you think you will see out there that you would want to preserve? Why is it important to preserve these?

On eight separate pieces of poster-sized paper write down the different statements relating to biodiversity (refer Worksheet 2) and hang each up across the classroom. Give the students a chance to read all of them and then ask them to stand by the statement they feel most strongly about. The students will then discuss their opinions with the other students that have chosen the same statement. Each group will then take turns to share with the class why they have chosen that particular statement. If any statement remains unchosen, discuss this with the class and work through accordingly.

Activity 3: Snorkel

Take the students for a snorkel in an area that is not a protected area (i.e. not a Marine National Park or Sanctuary). Have them list the number of different organisms that they see noting the size and number of species, as well as any rubbish that might be floating around. During their tour with Sea All, the students will snorkel in a Marine National Park where they will see for themselves the advantages of protected areas and compare between the two snorkel sites.

Post-Visit Activities

Following their visit students will have been introduced to a number of human impacts on Port Phillip Bay and the importance of preserving the biodiversity of the Bay.

Activity 1: Human Impacts on Port Phillip Bay

Students can continue to explore the issues that were introduced on their tour. Organise the students into three groups and have each group explore further into the issues of: over-fishing, pollution, or introduced species. Each group can use various resources to find information about their issue, the impact that it has on the environment, and strategies that may manage or minimise the problem. Each group can then present their findings to the rest of the class. The presentations can be done in the form of poster, Powerpoint, video, brochure, etc...

Activity 2: How can we protect the biodiversity of Port Phillip Bay?

This activity requires the students to use their knowledge and skills to come up with solutions that might protect the biodiversity of Port Phillip Bay. Begin by discussing the problems that are impacting upon the wellbeing of the Bay. Hand each student a copy of the “Priority Pyramid” (Worksheet 3a) and “Impacts on the Bay” (Worksheet 3b). The priority pyramid represents problems that need to be addressed in order to maintain a healthy bay. Students will create their own “Priority Pyramid” by adding each of the “Impacts on the Bay” in order of most to least destructive. The “impact” that they consider to be the most devastating to the health of the Bay would be at the very top and the least on the bottom. Once they have created their individual pyramid divide the students into groups of three. In these groups the students will share their pyramid with each other and then develop a group pyramid.

Using the agreed “top impact” each group will then develop some ideas to help reduce that particular problem.

For example: If the issue is over-fishing they would explain why it is a problem, what is being done about it today and what they could do to improve the problem.

OR

Using the agreed “top impact” each group will then design ways to educate the general public about the problem and ways of minimising it. For example, they could develop a brochure on the impacts of littering; have an information night to inform the public of the impacts of over-fishing; produce a Powerpoint presentation or web page; a video; or anything else that they can think of.

Activity 3: Controversial Environmental Issues

Analyse some of the different marine environmental issues, such as the ‘Channel Deepening’ or the impacts of the tuna industry on dolphin populations. Then have the students present their views in the form of a debate.

Activity 4: Conflict of interest

Hold debates on the conflicting interests between groups such as the dolphin tourism industry versus the research groups; or the Port of Melbourne and conservation groups (Blue Wedges Coalition).

Worksheet 1: Marine Biodiversity Quiz

Here's your chance to find out about the world's diverse marine plants, animals and natural places. For each question, circle the correct answers.

1. How many marine organisms exist on earth?

- a. 2 million
- b. 5000
- c. 342, 000
- d. None of the above

2. Which of the following actually exist?

- a. Squid that are bigger than 20m in length
- b. Spiders that live in the ocean
- c. Plants that have roots that stick out of the ground
- d. None of the above

3. Which of the following can be considered an enemy of Port Phillip Bay?

- a. Green Meanie
- b. European Fan Worm
- c. Long-finned Eel
- d. Northern Pacific Seastar

4. Which of the following best describes biodiversity?

- a. Endangered species
- b. All animals on earth
- c. Variety of all life on earth
- d. Different kinds of plants and animals

5. Australian Customs and Fisheries officers in Australian waters once found an Indonesian fishing vessel that contained which of the following?

- a. 20 Great White Sharks
- b. 200 kg of fish
- c. 18 sharks and 30 hooks with dolphin meat
- d. 2 dolphins

6. Approximately how much of the earth's surface is covered by water?

- a. 70%
- b. 30%
- c. 65%
- d. 50%

7. The Short-tailed Shearwaters migrate from Australia to Siberia each year to breed. Which of the following statements about them are true?

- a. They are commercially harvested for oil
- b. They don't really need to migrate
- c. It takes them one week to get from one side of the world to the other
- d. They can travel over 15,000 km in one direction.

8. Which of the following are true?

- a. Whales and dolphins produce greasy tears that protect their eyes for salt water
- b. Approximately 40% of sharks lay eggs
- c. Sharks can smell blood from over 1km away
- d. Electric rays can produce up to 220 volts of electricity

9. Humans use a variety of organisms for medicinal purposes. Match the medicines with what they were made from.

- | | |
|-----------------|----------------------------|
| Coralline algae | Anti-cancer |
| Seahorse | Medicine to fight melanoma |
| Sponges | Dental bone implant |
| Sea Hare | Aphrodisiac |

10. Which of the following foods often contain elements of seaweed?

- a. Toothpaste
- b. Eggs
- c. Ice cream
- d. Beer
- e. Bread

11. What's the most serious threat to biodiversity?

- a. People collecting organisms
- b. Habitat loss
- c. Disease
- d. Introduced species
- e. Pollution






12. Which of the following are true?

- a. In Victoria, Grey Nurse Sharks were hunted to extinction in the 1960s
- b. There are about 50 people killed by sharks worldwide each year
- c. Great White Sharks are considered endangered
- d. Of the 547 types of sharks and rays, approximately 20% are threatened with extinction

13. Approximately how much of the earth's oceans have been explored?

- a. 40%
- b. 5%
- c. 20%
- d. 15%

14. If the number of species on earth was represented by physical size, which of the following would most accurately illustrate the proportion of crustaceans/insects to mammals?

- a. 
- b. 
- c. 

15. The term "Biodiversity" could include:

- a. Colour of your hair
- b. Antarctica
- c. Your friends
- d. The organisms in your school yard

16. Which of the following are actual species of animals found in the ocean?

- a. Old wife
- b. Bastard Trumpeter
- c. Grasshopper
- d. Banana fish
- e. Groper

17. If you threw a party to celebrate the diversity of life on earth, how many invitations would you need?

- a. 300
- b. About 5, 000
- c. More than 1.5 million
- d. 720, 000

18. Some creatures live in really unusual places. Which of the following is sometimes a home for another living organism?

- a. Shark's body
- b. Fish gills
- c. Dolphins intestine
- d. Human's forehead

19. If you had to save all ocean species threatened with extinction, about how many endangered species would you need to save (based on what we know today)?

- a. 1356
- b. 232
- c. 5041
- d. 854

20. Which of the following environments are incapable of maintaining life on earth?

- a. The freezing ice of Antarctica
- b. Deep-sea hydrothermal vents where temperatures reach 350°C
- c. Sulfur springs where temperatures reach up to 100°C
- d. All of the above
- e. None of the above



Answers: Marine Biodiversity Quiz

Each correct answer is worth one point. There are a total of 42 points.

1. How many marine organisms exist on earth?

d. None of the above

It is difficult to say how many organisms live in the ocean as only a small proportion of the world's water has been explored. We still know so little about what lives in the deeper parts of the oceans. As technology is improving, scientists are finding more and more amazing species.

2. Which of the following actually exist?

- a. Squid that is bigger than 20 metres in length
- b. Spiders that live in the ocean
- c. Plants that have roots that stick out of the ground

We have some interesting plants and animals that live in or around the oceans. It's hard to believe that they exist. There are myths of ships being taken over by giant monsters with big tentacles, but could these old stories be true? The giant squid reaches lengths of around 18 metres, however scientists have found remnants of squids that they believe exceed over 30 metres (the Colossal Squid). Sea Spiders also exist, but unlike their land cousins they are completely harmless and don't spin webs. Another interesting organism is the Mangrove Tree. Mangrove trees can be found at the waters edge in muddy, sheltered environments and have roots called pneumatophores that stick up out of the mud. Unlike most trees these plants can breathe and do so through their pneumatophores.

3. Which of the following can be considered an enemy of Port Phillip Bay?

- a. Green Meanie
- b. European Fan Worm
- d. Northern Pacific Seastar

These are all introduced species that do not belong in Port Phillip Bay and are causing a lot of problems for our environment. The one that is causing the biggest problem is the Northern Pacific Seastar. It is a very good competitor, predator and breeder. Originally confined to the

north Pacific Ocean, it was introduced into Australia via ships ballast water. Since 1995 it has become a major pest by devouring anything and everything that cannot get out of its way. Today there are over 200 million seastars living in the bay, not surprising given that a single female can carry up to 19 million eggs.

4. Which of the following best describes biodiversity?

c. Variety of all life on earth

This includes everything - from the plants, animals, microorganisms, ecosystems, genes, habitats and more.

5. Australian Customs and Fisheries officers in Australian waters once found an Indonesian Fishing vessel with which of the following?

c. 18 sharks and 30 hooks with dolphin meat as bait.

Fisheries and Customs officers are commonly finding people fishing illegally. It is illegal to kill a dolphin in Australian waters let alone use it as bait. Regulations are set in place so that we fish sustainably and do not wipe out our fish stocks, as countries such as Indonesia has done.

6. Approximately how much of the earth's surface is covered by water?

a. 70%

Most of the earth's surface is covered by water. Think about the amount of diversity you would find in all that water.

7. The Short-tailed Shearwaters migrate from Australia to Siberia each year to breed. Which of the following statements about them are true?

- a. They were commercially harvested for oil
- d. They can travel over 15,000 km in one direction.

Short-tailed Shearwaters (Mutton Birds) can travel over 15, 000 km to reach their breeding grounds, but they usually take 3-4 stops along their way. They can make the distance in about 3 weeks. As they have such a rich and oily fat content (similar to whales) they have been harvested for both oil and food.

8. Which of the following is true?

- a. Whales and dolphins produce greasy tears that protect their eyes for salt water
- b. Approximately 40% of sharks lay eggs
- c. Sharks can smell blood from over 1km away
- d. Electric rays can produce up to 220 volts of electricity

Not only do we have some fascinating creatures out in the oceans, but they have some amazing adaptations to help them with survival.

9. Humans use a variety of organisms for medicinal purposes. Match the medicines with what they were made from.

- | | | |
|-----------------|---|----------------------------|
| Coralline algae | ? | Dental bone implant |
| Sponges | ? | Anti-cancer agents |
| Seahorse | ? | Aphrodisiac |
| Sea Hare | ? | Medicine to fight melanoma |

Given that about 80% of all life forms are found in the ocean, marine biotechnology is booming. Numerous promising products are being developed from marine organisms, including a cancer therapy made from algae and a painkiller taken from the venom in cone snails. This is yet another reason why it is so important to protect the biodiversity of our oceans.

10. Which of the following foods often contain elements of seaweed?

- a. Toothpaste
- c. Ice cream
- d. Beer
- e. Bread

Seaweed extract is used as an emulsifier in many foods. It helps bind the food together.

11. What's the most serious threat to biodiversity?

- b. Habitat loss

People love to live by the water. With the rapid population growth, habitat loss is occurring at a rapid pace. All along the coast, habitats are being destroyed and developed for houses,

cities, schools, roads, shopping centres, farms, and harvested for wood and fuel.

12. Which of the following are true?

- a. In Victoria Grey Nurse Sharks were hunted to extinction in the 1960s
- c. Great White Sharks are considered endangered
- d. Of the 547 types of sharks and rays approximately 20% are threatened with extinction

Unfortunately sharks are exceptionally susceptible to over-fishing and are disappearing at a rapid rate across the globe. This decline in numbers is also due to people's perception of these animals. Only around 7 people are killed by sharks worldwide every year – statistically you have a greater chance of being killed by a coconut. It was this overwhelming perception of sharks being "man-eaters" that led to the local demise of the Grey Nurse Shark.

13. Approximately how much of the earth's oceans have been explored?

- b. 5%

There is a lot of water out there! We know more about the moon than our own planet!

14. If the number of species on earth was represented by physical size, which of the following would most accurately illustrate the proportion of crustaceans or insects to mammals?



There are approximately 250 species of arthropod (insects, crustaceans etc) for every species of mammal on this planet.

15. The term "Biodiversity" could include:

- a. Colour of your hair
- b. Antarctica
- c. Your friends
- d. The organisms in your school yard

16. Which of the following are actual species of animals found in the ocean?

- a. Old Wife
- b. Bastard Trumpeter
- e. Groper

These are just a few examples of some of the many strange and wonderful creatures of the oceans. The Old wife is a type of fish that inherited its name from fishermen that said the fish grumbled like their old wives.

17. If you decided to throw a party to celebrate the diversity of life on earth, how many invitations would you need?

c. More than 1.5 million

Although this party may get bigger... Scientists have estimated 100 million species may exist on earth!

18. Some creatures live in really unusual places. Which of the following is sometimes a home for another living organism?

- a. Shark's body
- b. Fish gills
- c. Dolphins intestine
- d. Human's forehead

All of the above! Animals that live in other animals are generally parasites. That is, they feed off another organism, for example a leech can attach itself to a person and suck its blood.

19. If you had to save all ocean species threatened with extinction, how many endangered species would you need to save (based on what we know today)?

a. 1356

Until recently, humans tended to think that the ocean was a source of infinite resources, because of the sheer size of it. Unfortunately this couldn't be further from the truth. Many species are decreasing at an unsustainable rate, and the number of species endangered could be far greater than we think, given that we know so little about the organisms living in our oceans.

20. Which of the following environments on earth are too severe to maintain life?

e. None of the above

Surprisingly, life has been discovered in all of these habitats. Microorganisms are able to thrive in these conditions.



Worksheet 2: Why care about the environment?

Write each of the following eight statements on separate pieces of poster paper and then hang them up around the classroom.

- 1. Conserving species is important for medical and economic reasons.**
- 2. All organisms have the right to exist.**
- 3. Our lives would not be as rich if we lost species, such as dolphins, seals, turtles, fish, gannets, etc...**
- 4. As all things are linked, biodiversity is essential in maintaining ecological processes that help support life on earth.**
- 5. No one has the right to destroy the environment that other people depend on.**
- 6. Biodiversity is important for inspiring creativity and imagination.**
- 7. Biodiversity is important for recreational activities, such as snorkelling and fishing.**
- 8. Other**



Worksheet 3a:

Priority Pyramid



Worksheet 3b: Impacts on the Bay

