



## **How do Ports Affect our Lives? Middle Years Sustainability Unit**

NB These teacher curriculum notes are accompanied by a second PDF file of activity sheets.

This unit of work is designed for middle year students. It has a student learning focus and anticipates that you the teacher will coordinate your students' learning and there is little need for instruction.

The activities require students to use the accompanying web pages. These pages have been developed using the following criteria:

- Designed to engage students who are reluctant to read. Each page is kept to less than 200 words.
- A core set of potentially new key words are introduced to students. There are not too many new technical words for your students to remember.
- The pages have an appropriate literacy design with a suitably sized text, the illustrations support the text and there are no gimmicks.
- The website is designed to be handled by school networks.
- Your students are provided with recommended websites for those who are motivated to go deeper.

The topic will enable your students to learn at a deeper level. They will make many links in their understandings and insights. They will learn and discover links between the following:

- How the majority of the world's goods are efficiently and safely moved through ports connecting ships with local transport.
- The many services that must be provided to run a port. This provides many different types of jobs and involves many businesses.
- The impact on local communities.
- Precautions required by ports and shipping to avoid environmental problems.
- While shipping is the most efficient method for moving goods, the volume being shipped between Australian ports has been declining.
- Benefits obtained from the activities of ports and shipping.

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## 1. Classroom preparation

How can your classroom be organised to provide a stimulating learning environment about ports? Will you want to set up the class before your students start the unit?

Some ideas could include:

- Ask your students to contribute ideas to the classroom setup.
- Locate posters and maps of the world and Australia and place them on walls.
- Make sure you have access to computers that are connected to the Internet.
- Find out what resources are available in the library. Will you borrow some of these books?
- Locate videos, DVDs and CD-ROMs.
- As a prior learning activity, each student could contribute a piece of artwork. Start with a large board or part of a wall. Make an outline of a port and the sea beside it. Keep the port area clear for the moment. It can be filled in as students learn about ports. In the sea area they could make an image of a large ship and include a range of wildlife including dolphins, seals, turtles, birds, fish, sharks etc.
- Load a marine screen saver onto computer screens.
- Identify a location where students' work will be displayed.

## 2. Activities – Prior learning

**Materials:** Art and craft materials, colour pencils, A4 paper

**Background:** Prior learning activities enable students to value what they already know about a topic. It provides their teacher with some insight into what their students know and think.

**Activities:** Choose one or more of the following activities or provide an activity of your own. Ideas for prior learning:

1. Start with a large board or part of a wall. Make an outline of a port and the sea beside it. Keep the port area clear for the moment. It can be filled in as students learn about ports. In the sea area they could make an image of a large ship and include a range of wildlife including dolphins, seals, turtles, birds, fish, sharks etc. The artwork in the sea would include what they know about this environment.
2. Use activity sheet 1. It has five aspects about ports for students to write about. They are:
  - What do shipping ports do?
  - Where would you find ports?
  - Why are ports important?
  - How can ports impact on the environment?
  - What kinds of ships and boats are found in ports?
3. Individuals draw an environmental postcard or sticker providing a message about the importance of the marine environment. They each have a maximum of 30 seconds to present their product to the class.
4. Students are given 5 minutes to describe the port closest to them. They can write and draw and label diagrams. After 5 minutes, the class collates all the information to describe the port closest to them.



### 3. Student goals and assessment

**Materials:** Copy of “Student goal setting” activity sheet

**Goals background:** Goals assist students to be more involved in self-directed learning, to remain on track and meet their learning objectives.

**Activity:** Student goals can be developed using the following three areas:

1. Goals developed from the above authentic learning question “How do Ports affect our Lives?” The goals can include:
  - Understanding the role of ports in the transport of goods, connecting local transport with ships; the goods being transported around the Australian coast and the world.
  - Investigate how goods get from one place to another.
  - Investigate the precautions required to prevent ports and ships in the ports from impacting on the marine environment.
  - Create experiments to determine how cargo can be handled and how environmental problems can be managed.
  - Develop a communication product that links the better transport options to a more sustainable environment, including the marine environment.
2. Goals can relate to the Learning Outcomes or Standards you will be assessing during this unit of work.
3. Individualised student goals can also be developed. These personal goals are aimed at improving individual’s learning needs. For example each student will have reflected on their last unit of work. They should be able to identify two aspects where their learning can or should be improved.

**Assessment background:** Education systems have greater expectations concerning assessment. Having assessment processes in place throughout a unit of work and involving students in their assessment will assist teachers meet these expectations:

- **Assessment for learning** will help teachers respond to students’ learning needs during the unit of work.
- **Assessment as learning** occurs when students monitor their own progress and make learning choices.
- **Assessment of learning** occurs when teachers use evidence of what students have achieved. Teachers are often obliged to measure this against Learning Outcomes or Standards.

Explain to students how they will be assessed. To assist you with assessing your students throughout the unit of work:

- A grid of suggested assessment tasks has been provided.
- A rubric (that you may wish to modify) is available in the activity sheets.



Theme	Examples of assessment tasks
Activities – Prior learning	<ul style="list-style-type: none"> <li>• Participation and contribution to a class activity.</li> <li>• A well-considered input relating to their prior knowledge.</li> </ul>
Student goals and assessment	<ul style="list-style-type: none"> <li>• Able to record the required goals for the unit of work.</li> <li>• Shows an understanding of their personal learning needs by setting personal learning goals.</li> </ul>
Finding out	<ul style="list-style-type: none"> <li>• Organising work in a team. Working cooperatively with others.</li> <li>• The team takes control of the research.</li> <li>• Sharing information.</li> <li>• Working independently.</li> <li>• Completing tasks on time.</li> <li>• Using different sources to obtain information and solve problems.</li> <li>• Using technology effectively to obtain information.</li> <li>• Providing evidence of how and where they found information.</li> <li>• Extracting and making notes of the appropriate information to answer their questions.</li> <li>• Present ideas and information using a range of formats and media.</li> <li>• Appropriate use of media in preparing a report.</li> <li>• Creating simulations and using experimental procedures to demonstrate how processes can work.</li> <li>• Presentation demonstrates that students answered their questions.</li> </ul>
Drawing conclusions, finding solutions	<ul style="list-style-type: none"> <li>• Organising work in a team. Working cooperatively with others.</li> <li>• Able to weigh up a number of options.</li> <li>• Use creative strategies to solve problems and prepared to take learning risks.</li> <li>• Shows an understanding of how people’s activities link to marine pollution.</li> <li>• Presentation of their solutions.</li> </ul>
Considering Social Action: Communication project	<ul style="list-style-type: none"> <li>• The content of the communication product demonstrates their understanding of the unit of work.</li> <li>• An appropriate medium has been chosen and justified for a specific audience.</li> <li>• The communication package is engaging to the chosen audience.</li> </ul>



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|  | <ul style="list-style-type: none"> <li>• The medium has been used in an appropriate way.</li> <li>• The communication product demonstrates creativity.</li> </ul> |
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## 4. Tuning in

### 4.1 What are ports about? – SPEED SEARCH

Divide students into groups of two. They will do a speed search using an internet search engine and report back to the class on two interesting facts about ports. The groups will be given no more than 5 minutes. First they should decide on two words they will use to search for information about ports.

Reporting: When students report to the class they start by stating the two words they used in the search engine and have 30 seconds to present their two facts.

At the conclusion ask students what new things they learnt about ports.

### 4.2 Percentage imports

Step 1: Each student plus the teacher names a different manufactured item that is present in the classroom. Each item is listed on a three column table.

Step 2: Use the other two columns to list if the item is imported or mostly made in Australia.

Step 3: Work out the percentage of items manufactured overseas and which have passed through ports to get here. (Percentage = Imported items, divided by the total items multiplied by 100)

If this activity was done in your living room, would the percentage be the same or different? Explain.

### 4.3 Virtual tour

Take a virtual tour of a port. If using a search engine use the word 'shipping' as well as 'port', as many place names include the word 'port'. Examples include:

[www.portbris.com/aboutport/virtual](http://www.portbris.com/aboutport/virtual)

[www.virtuar.com/ysf2/fishermans\\_wharf.htm](http://www.virtuar.com/ysf2/fishermans_wharf.htm)

[www.doverport.co.uk/?page=DoverCruisePortVirtualTour](http://www.doverport.co.uk/?page=DoverCruisePortVirtualTour) (click on 'Dover Cruise Terminal Film')

Also see Links

## 5. Finding out – web research

### 5.1 Authentic learning question

**How do ports affect our lives?**

Class discussion



Use a thinking tool that students are familiar with to examine the question. The tool should be able to relate ideas. Examples of tools include a mind map, tree chart, a word web or put each idea into a bubble and link it to other ideas.

As a class examine the authentic learning question: **How do ports affect our lives?**

What do we think this question means?

Why are ports needed?

What cargo moves through ports?

Are ships the best form of transport?

How do ports link local transport with ships?

How are local people affected by ports?

How are businesses affected by ports?

What products moving through ports could be dangerous to people and the environment?

What must ports do to protect people and the environment?

## 5.2 It's only words

Small group activity and report back to the class

Use the glossary to distinguish between the following words:

- Ballast water
- Bollard
- Bulk carrier
- Bunker barge
- Cargo hold
- Container
- Conveyor belt
- Harbour master
- Pollution
- Stevedore

## 5.3 Research using the web

### 5.3.1 How do ports affect our lives?

Students should start their research with the AUSMEPA website [www.ausmepa.org.au](http://www.ausmepa.org.au) and locate the web pages on **How do ports affect our lives?** Students will find many other websites of interest. As a class ask them what they may need to find out about shipping and the marine environment. These are some of the questions that could be asked:

- Why are ports needed? What percentages of the world's goods are moved through ports?
- Why are there different kinds of ports?
- How do ports handle different types of cargo?
- How are ships safely docked in a port?
- How is cargo moved on and off a ship?
- How is cargo stored in a port? How is it transported by road or rail?



- How is cargo tracked so it gets to the correct destination?
- What do the following services do:
  - Customs
  - Quarantine
  - Security
- **Why is shipping and rail more energy efficient than road transport?**
- What needs to be done to keep ports safe?
- Why does the marine environment need protection?
- How do ports protect the marine environment?
- What port is closest to students? What cargo is imported or exported?

You may want students to record how they went about finding their information when using a search engine. This format could include:

1. Question they are answering.
2. The search engine they have chosen (provide a reason for choosing it).
3. The key words they have used for their search.
4. The information they have found to answer the question.
5. How reliable they rate the source of information.

This documentation could be used as their report. You may like to provide students with a short period of time to give a report on what they found to be the most interesting, surprising or disturbing information.

### 5.3.2 Linking back to the source of our petrol

What kind of journey has petrol already done before it goes into the family car?

Provide students with art materials and access to the internet. In this activity students need to make a labeled diagram starting with the family car. They have 15 minutes to find the information and make their diagram. On their diagram they will show the journey their petrol has made from the oil well to their local service station. Some of the things they need to find out are:

- How petrol arrives at the service station.
- Where the refined petrol came from within Australia.
- Where was the petrol processed?
- How did it get to the location where it was processed? (all the steps)
- Where in the world does most of our oil come from?
- How does it get from the oil wells to Australia?

Compare the diagrams. How many steps are involved?

### 5.3.3 Research using the web – Port issues and safety

Use the ABC website or one of the large newspaper or other media networks to do a search concerning issues about ports. One of the difficulties about doing a search is that many locations have the word 'port' included as part of their name.



Students are to find out what emergencies and other issues occur in ports and what information is provided to the public about port safety. Students should note the date of each report. They should find at least two issues of interest and two ways ports work to make a safe environment.

In the search engine of the chosen news media website type the following words to find out about port safety and related issues:

- Port safety
- Port emergency
- Ship safety
- Ship emergency
- Can students find a better combination of words to quickly find information about safety and emergencies in ports?

#### **5.4 Where is my container?**

Find out how freight containers are able to reach their destination in another part of the world.

- How are containers tracked?
- How can each container be identified?
- What is done to make sure each container is loaded onto the correct ship?
- What is done to make sure each container is unloaded from the ship at the correct port?
- How does the importer know their container has arrived?

#### **5.5 Research using the web – Goods on the move?**

##### **Background**

Most of our international trade is moved by sea. However over the years there has been a steady decline in the shipping of goods between major Australian ports even though the amount of goods being transported has been increasing.

Students use the internet to research their questions. They should start by using [www.ausmepa.org.au](http://www.ausmepa.org.au) Students with higher reading skills might refer to Wikipedia, <http://en.wikipedia.org> and find references about shipping using the search engine. There is a lot of information about protecting the marine environment on the internet including the AUSMEPA website. Students should compare the fuel efficiency of ships, rail and using the road.

#### **5.6 Border security**

Make copies of the story board activity sheet that can be found in the activity sheet PDF file.

Step 1: Ask students to watch an episode of 'Border Security' or play an episode to the class.

Step 2: Discuss what elements are common in each of the situations presented. How might this be different in a port?

Step 3: In small groups, students use a story board to show how an incident could be filmed in a port. Examples of incidents could be:



- importation of drugs
- avoiding import duty or other taxes on goods
- importing fake goods
- importing illegal firearms
- soils and contaminated plants among the cargo
- someone moving to Australia from overseas has a container of unknown household items etc.

## 6. Finding out – experimenting using science and technology

Small group activities

Small groups choose one of the following activities and design solutions to meet the challenge.

### 6.1 Moving containers

#### 6.1.1 Container transporters

Design a working model of a crane or other device that can transport a container. Identify the purpose of the machine e.g.

- placing or removing containers onto a ship
- moving containers around a port and stacking and removing them
- moving containers safely into and out of a port.

Use pulleys, wheels and other simple devices to operate the machine.

#### 6.1.2 Balancing a container

Use a brick to represent a scaled down container for experiments. Find out how far apart the forks on a fork lift must be to keep the brick stable. Make sure a margin of error is allowed. If the brick was twice as long would the distance between the forks need to be greater?

How must the weight of the fork lift be distributed so that the container (brick) does not tip the forklift over?

Does the lifting of the brick up into the air change the centre of gravity of the forklift?

#### 6.1.3 Container locking device

Make a simple mechanism that would lock containers together. (It does not need to be the same as on a container). The model could be made from cardboard.

### 6.2 Moving liquid cargo

Design a working model to transport a liquid between small improvised storage tanks. While you may not be able to pump the liquid, make the system work so that it has the least chance of leaking. You may wish to build safety features around the tanks in case of a leak. Consider using garden supply fittings to make the model.

The model would be designed to transport oil, however it would be easier to use water. If the model is used with oil, use vegetable oil which is more easily disposed of and will not generate vapours.



### 6.3 Moving minerals, wheat and other bulk cargo

Design a working model that can move sand. It may be a grabber, front end loader, conveyor belt, or a system that works on a screw principle etc. You will probably need to use your hands to power your model. Find out how effective your model is. Make more modifications to improve its effectiveness.

In a port there must not be any spills or dust when moving bulk cargo. How difficult would it be to make a model that did not spill any sand?

### 6.4 The challenge of an oil spill

**NB** In all experiments use cooking oil. At the finish of the experiments, the oil should be placed into a container and put into the school's rubbish system.

#### Materials:

- Cooking oil
- Plastic tubs
- Jar
- Eye droppers
- Various materials for making booms and mopping up oil
- Art and craft equipment, possibly pliers and flexible wire.

#### 6.4.1 Oil and water do not mix

Using a jar, find out what happens when oil (cooking oil) and water mix. Using a tub with water, find out how much a drop of oil can cover on the water.

#### 6.4.2 Containing the oil

Oil spills are often contained using floating booms. Try to make a model of a floating boom. Can it keep contained a small amount of cooking oil? Does the boom still work if there are small waves?

#### 6.4.3 Mopping up the oil

Place a small amount of oil in a plastic tub with water. Use different materials to find which is the most effective at mopping up oil. Once the oil is in the material, how can it be extracted? Make a simple plan of a machine that could mop oil from the sea.

#### 6.4.4 Dispersing the oil

When one drop of oil is placed in a tub, will waves disperse the oil? How many drops of oil are needed before the oil cannot be dispersed?

Place 20 drops of oil into a plastic tub of water. How many drops of liquid detergent are needed to disperse the oil?

### 6.5 You're the boss

You are operating a small port that can take up to two container ships. Your job is to make a plan for holding the containers that are either being loaded onto ships or unloaded from ships.

You will need to know this information when making your plan.



1. You have 50 regular customers that import or export containers. These customers are 98% of the business. On an average week 350 containers are imported and exported. However there can be up to 700 containers in a week.
2. The same number of containers are imported as are exported.
3. It takes 3 to 7 days to clear 99% of imported containers from the dock.
4. Containers for export start arriving up to 20 days before the ship docks.
5. The wharf is 500 metres long.
6. You can use all the land behind the wharf for storing containers.
7. But you must try to reduce the distance containers are moved around the port.
8. The maximum length of a container is 12.1 metres. (Max length of a container is 12.18metres)
9. You can choose where the roads go and the railway line is located.
10. You must make sure that containers being moved on and off ships are not being disrupted by road and rail transport which are picking up or delivering containers.
11. You can choose whatever equipment you want to move containers around the port.
12. There must be security for anyone entering the port.

Make a scaled drawing of your port. Explain how the containers in your port will be tracked. How will you make sure that the containers are not moved around too often? Show how containers from road and rail transport are moved to the ship.

## 7. Drawing conclusions, finding solutions

### 7.1. Thinking

Whole class discussion

As a class, use these different ways of thinking to explore and expand what students have learnt.

**What students know** – What do you know about ports? How many of the things we use have come through a port? What goods are transported through ports? What happens to petrol before it arrives at a petrol station? How must ports protect the environment? How do ports influence the town and community they are located in? What kind of jobs do ports provide? What is the most fuel efficient way to move goods?

**How students feel** – How do you feel about the conservation of marine life? Should we be using the most fuel efficient transport available? Do you feel ports are good for towns and communities? Should we be trying to reduce the number of trucks using the highways?

**Students are critical thinkers** – Are ports the best way to link road and rail with ships? Is enough being done to reduce things like drugs and illegal weapons coming into Australia? Is enough being done to reduce the risks of new pests coming into Australia? Why aren't ships used more to transport goods around Australia? Are ships a safe form of transport? Are ships and rail safer than trucks? How difficult is it to prevent the sea from being polluted?

**Students find the benefits** – How are ports important to people? How does a port help a town and its community? Compared with road transport, how does shipping benefit the environment? What are the advantages of carrying large volumes of goods on a ship?



**Students are creative, find solutions and make recommendations** – How can we get more goods that require long distance travel to use ships and rail? How can governments influence the use of ships, rail and trucks?

**Where do students go from here?** – How has your way of thinking about transport of goods changed? Should we encourage a greater use of shipping and rail?

## 7.2 Daily news

Write a short news report about the purchase of new ships to transport goods between Australian ports. Explain between which ports the ships will be operating, and what their cargo will be. Explain to the reader how the ships will have environmental benefits.

## 7.3 Issues

### 7.3.1 Should shipping (and rail) be encouraged to move more goods?

As a class develop a list of advantages in using ships and rail to move more goods, particularly between major Australian cities.

### 7.3.2 Why can't authorities be doing more?

Students start developing a set of solutions that reduces the use of interstate highways for the transport of goods in favour of ships and rail. They identify which authorities need to be influenced to generate change.

## 8. Considering social action and communication

### Introduction

Students will complete a communication project related to transport.

- They could choose to influence an authority's or political party's policies to encourage goods to be transported using the most fuel efficient methods and those that have the least impact on people and the environment.
- Alternatively students may wish to develop a more general communication package directed at using more fuel efficient methods and changing driving behaviour when transporting ourselves about.

### 8.1 Influencing decision makers

#### 8.1.1 What needs changing?

Develop a very clear written statement that explains:

1. The problem that is occurring
2. What needs to be changed
3. What the benefits of the change will be to the environment and to people and their communities

#### 8.1.2 Who needs influencing?

What authorities or political influences can help solve the problem? Brainstorm ideas. Which groups or individuals might be easiest to target?



### **8.1.3 What media will have an impact?**

Once students have identified their targets to influence, they need to brainstorm different ways they might communicate with their target group. Some methods are more achievable by students than other methods. Students will need to be advised very early in their planning if the school agrees to their method of communication. When corresponding with politicians, always ask questions that require a response.

- Examples of communication media can include: Letter to politicians
- Email to politicians
- Media release explaining concerns students have
- Petition
- Surveys of opinions
- Web materials
- Email letters to the community about the issue
- Web conference with other concerned students
- Articles for publication in local newspapers.

### **8.1.4 Planning**

Complete a summary of the plan and submit it to the teacher in case there are issues that students had not considered. Once students have teacher feedback, students can complete their plan.

### **8.1.5 Implementation**

Teachers will need to provide guidance as students implement their plan. Students should not feel disempowered by not being adults. Often sincere younger people will be more noticed than experienced campaigners. However the communication project is developed, try and build in feedback. This can be done by asking some probing questions that require answers.

## **8.2 Influencing road users to be more fuel efficient**

### **8.2.1 Brainstorming**

Develop a list of ideas about how road users can use less fuel. The list can include these adult solutions:

- Drive a smaller car.
- Next time you buy a car, purchase a more fuel efficient car.
- Plan ahead so you need to do fewer trips.
- When driving, avoid accelerating quickly.
- Use public transport when you can.
- Walk or use a bicycle when you can.

These student solutions:

- Sometimes, use the phone, Facebook, etc instead of being driven to friends.
- Use public transport when you can.
- Walk or use a bicycle when you can.

### **8.2.2 Planning**



## Small group activity

Small groups each choose one solution to use to plan a communication project. They will need help to be sure all aspects of their planning are covered. Because some of their solutions could be unique, it is not possible to list every contingency in the list below, so it is important that their teacher carefully goes through each plan making necessary modifications, before students implement their plans.

Before students start their plan they should answer the following about their solution:

- What will be achieved by this solution?
- What are the benefits that will result from the solution?
- Why is this solution important to the health of the environment?
- How might the solution benefit people?

Criteria students may need to consider when making their plan:

- Start by organising all the steps needed to implement the plan.
- Identify who will need to approve and comment on the plan.
- What tasks are going to be done to put the plan into operation?
- What resources will be needed to do the tasks?
- Who will do the tasks?
- How will students remain safe?
- How much time will be needed to complete the solution?
- How will the group measure how successful their solution was?

Produce a first draft of the plan and submit it for comment. When the comments have been received, make the necessary changes. To make sure students are clear about the comments, it may be helpful to also provide verbal feedback.

## Choosing an audience

Students will be developing a communication product for an audience. The communication product explains to an audience something they can do to reduce the amount of fuel used in transporting goods and people. [Or similar] Students will need to:

1. Choose an audience e.g.
  - a. Other students
  - b. School administration
  - c. Families
  - d. Council
  - e. Car drivers
  - f. Shoppers etc
  - g. People in authority
  - h. etc.
2. Identify the main interests of their audience.
3. Identify the kind of media their audience encounters each day.

## Analysing their audience



Ask students to analyse their audience by:

1. Linking the interest of their audience to the message they wish to communicate.
2. Identifying appropriate media that link the message and the interest of their audience (the media are often restricted by the budget available). Communication products can include:
  - a. Posters
  - b. Billboards
  - c. Radio commercials
  - d. TV commercials
  - e. Newspaper advertisements
  - f. Press releases
  - g. Musical jingles
  - h. PowerPoint presentations
  - i. Webpages
  - j. Newsletters
  - k. Email letters
  - l. Competitions

### **Develop the communication product**

Allow groups or individuals to design and develop their communication product. Students should write attached notes explaining how their product should work.

#### **8.2.3 Implementing the plan**

Teachers will want to review with students relevant aspects of the school's code of behaviour and OH&S procedures that will protect students. As most students will be working with a large degree of independence, they will need to report back to their teacher on their progress.

Once students are ready, they should implement their solutions.

### **9. Student evaluation of communication project**

#### **PMI student assessment**

Use the "PMI" activity sheet. PMI stands for plus – minus – interesting. In this activity students look at another student's work and write down what they think the pluses and minuses are and describe what they found interesting. Ask students to complete a PMI so that each piece of work has at least two or more assessments. The PMI assessment should not be written on the other student's work.

### **10. Reflection**

**Materials:** Reflection activity sheet

**Background:** Reflection time provides students with an opportunity to value what they have learnt and the learning processes they have been involved in.



### **Activity 1. Reflection activity sheet**

Your students may have preferred reflection strategies, so they should use these. The reflection activity sheet in this unit of work can be used to provide some structure while reflecting.