



## “Exploring Sawfish” Ideas for Studies of Society and Environment

### Activities linked to grade levels P - 10

Talk about sawfish. List all ideas. Ask questions such as: (P – 10)

- What are sawfish?
- Why are they important?
- What life do they support?
- What plants and animals live in the sea with them?
- What would an oil spill do to the waters in which sawfish might live?
- Where did a real-life oil spill occur?
- What might happen if plastic is left in the waters in which sawfish live?

Use the question grid below to stimulate more questions. (P - 10)

What is?	Where/when is?	Which is?	Who is?	Why is?	How is?
What did?	Where/when did?	Which did?	Who did?	Why did?	How did?
What can?	Where/when can?	Which can?	Who can?	Why can?	How can?
What would?	Where/when could?	Which could?	Who would?	Why would?	How would?
What will?	Where/when will?	Which will?	Who will?	Why will?	How will?
What might?	Where/when might?	Which might?	Who might?	Why might?	How might?

Talk about the natural features of the waters in which sawfish live. Record information about these places *e.g. colours, plants, animals seen within and around it, and different parts of the marine environment.* (P - 10)

Create a concept map showing of what the sea consists. (4 - 10)

Make a chart describing the molluscs, crustaceans, fish, echinoderms, corals and sea grass in the sea. Sort and classify descriptions into categories. (4 - 10)

Develop awareness of places in which sawfish live localities. Ask questions like:

- Where are these places?
- What is this place like at present?
- Why is it like this?
- What is currently happening to this place, and what factors influence this?
- How could this place change?
- Why might this place change?
- What grows here?
- What animals live here? (4-7)

## MESA Seaweed 2008 "Extinction – a Saw Point"

Collect or download photographs of sawfish. Visit [www.mesa.edu.au](http://www.mesa.edu.au) . Discuss features of these animals and where they live. (4 - 8)

Identify things that animal/plant groups have in common and note differences. (4 - 6)

Write phrases that describe the different species, and how and where they might live. (5 - 8)

A number of 'nasties' impact on sawfish. Research them. Find out how they can harm sawfish. Consider how sawfish can be protected. (5 - 8)

Research threats to sawfish. As a class, discuss which issues are affecting sawfish are most important to tell other people about. Develop a web page, brochure, or a segment for television or radio, case study for a journal or newspaper or piece of art to communicate the issue. (4 - 8)

Discuss how the sawfish as a species is important to education, tourism, and scientific research. (5 - 8)

Talk with students about how all organisms in the sea are connected, and share the same resources. Ask students to compile a table of the main physical characteristics of marine 'ecosystems' or the plants and animals in the sea e.g.:

<b>Ecosystem</b>	<b>Main features</b>	<b>Characteristic plant species</b>	<b>Characteristic animal species</b>

Use additional references to learn about characteristic species, *for example: what they look like and special features that help them survive.* (6 - 8)

Draw a flow chart to illustrate the effects of removing creatures from the sea e.g. *consider what the sea might be like without sawfish, echinoderms, molluscs, crustaceans, and sea grass.* (6 - 8)

Locate information on the MESA Seaweed 2008 website about the way in which the reef and its plants and animals are managed. See: [www.mesa.edu.au](http://www.mesa.edu.au) (6 - 10)

Conduct a group discussion or debate about an issue that impacts on sawfish. Identify one such issue within the school's local community and explore the range of views that people might hold on the matter. As a class, formally or informally debate these views. (7 - 10)

Ask students to interview a member of their family or a trusted adult about their environmental concerns and any activities they have undertaken related to sawfish or another threatened species. (6 -10)

## **MESA Seaweed 2008 "Extinction – a Saw Point"**

Focus on one (or more) species living within a marine or coastal environment. Students could address the following issues: (7 - 10)

- Are the species endangered, vulnerable, or threatened?
- Where do they live?
- Describe their natural habitat.
- What does it need to survive?
- Describe any special adaptations the species may have that enable it to live in different habitats.
- Why is it endangered, vulnerable or threatened?
- What strategies are in place to protect/manage the species?
- What is the role of the local Authorities in the management of this species?

Use effects wheels to investigate the changes to the environment likely to lead to species becoming endangered or ultimately extinct. Consider the immediate effects of such changes and then second- and third-order effects that may result. (7 - 10)

Talk about ways endangered marine species can be conserved. (7 - 10)

Get involved in volunteer efforts that support the monitoring of our reef species. Find out about the Order of Underwater Coral Heroes (OUCH), Waterwatch, Fishwatch, COTSwatch, Sea grassWatch, and Reefwatch (6 - 10)

### **Brainstorm**

Activities linked to grade levels 4 - 10

Ask students what they expect to find and do when they go to a marine or coastal environment. List responses on cards for students to group in later activity. Students suggest names for a range of categories such as:

- Animal life
- Landforms
- Plant life
- Things humans have built on the reef
- Things seen or found in the water
- Things seen or found on the land
- Other beach activities
- Things people eat
- Games to play
- Things to do
- Things people use
- Things seen in the air.

Sort responses and ask students to give reasons for their choices.

Students can also sort and categorise information using a grid or Venn diagram to show how one item may belong in two or more categories.

## MESA Seaweed 2008 "Extinction – a Saw Point"

### Caring for the environment

#### Activities linked to grade levels P - 10

Things you can do to help protect the animals and plants within the sea. (P – 10)

- When visiting the sea, remember the sea is alive, so be careful where you walk and try not to damage anything.
- If you move any plants or animals, always return them to exactly where you found them. Otherwise they might die. Remember some animals can't survive for long out of water.
- Do not leave any rubbish behind. It can be dangerous for marine animals.

Read "*One Less Fish*" by Kim Michelle Toft and Allan Sheather, and *A House for a Hermit Crab* by E Carle. As a class discuss ways students can care for the marine environment on the visit. Make a three-column chart with headings: 'Our action', 'Is it good or bad?' 'Why is this so?' Present scenarios based on students' experiences to add to the chart. (P - 10)

For example:

Our action	Is it good or bad?	Why is this so?
Leaving fishing line on the beach	Bad	Might entangle living creatures
Taking our rubbish home from the visit	Good	Reduces risk to animals, and enables plastic, glass to be recycled

### What we know: knowledge circles

#### Activities linked to grade levels 5 - 9

Students sit in two concentric circles. Arrange students in pairs, facing opposite directions. Each pair exchanges information about the sawfish as a threatened species to show what students investigated and learnt. After a given time each circle moves on one place. Repeat the exchange of information in a new pair. Continue until students have shared information with several classmates. Re-form as one large circle. Move around the circle, each student contributing one piece of information they learnt from another student.

Transfer information onto cards and sort, using categories such as natural features, tourist attractions, sea creatures, ecosystems, biodiversity, vegetation, issues, recreational activities, activities related to caring for and valuing marine areas.

### Cross-sections or models

#### Activities linked to grade levels 4 - 10

Students produce annotated cross-sections of a typical coastal zone either as a chart, or by using computer graphic programs, or by making a small model from "recycled" materials. These can subsequently be compared with the local metropolitan beach to understand how the coastal zone has been modified by human activity.

# MESA Seaweed 2008 "Extinction – a Saw Point"

## Issues and values

### Activities linked to grade levels 6 - 10

Identify a number of issues potentially affecting the future of the sawfish or other marine environments and their species. For each of these conduct a 'values – continuum' activity. Small groups of students brainstorm list of issues to be represented on the values – continuum, and the values that lie behind them. The students then mark their position on the continuum.

For example, consider the following propositions:

- An area of the sea is to be set aside for unlimited access by any type of vessel, from surfboards to ocean liners.
- An area will be made available that would allow up to 2,000 pleasure craft to moor on a reef at anytime.
- Twenty five per cent of the area is to be set aside in green zones that will allow snorkelling and diving, but ban fishing, including line fishing and spear fishing.

What attitudes towards the environment do these proposals suggest?

### How does what we do at home and school impact on threatened species like sawfish?

#### Activities linked to grade levels P - 10

Discuss ways in which the sea receives waste and pollution, both through deliberate dumping and by run-off from the land. (P – 10)

Talk with students about the ways in which what we do at home and school can affect the sea and oceans. (P – 10)

Discuss what happens when water goes down a drain at school. Describe what might be contaminating the water that goes down the drain, such as dirt from washing hands, paint brushes, or glue pots. (P – 10)

Brainstorm ways the class might avoid disposing of chemicals down the drain, e.g. by scraping left over paint into paint pots, clean paint palettes using newspaper, not using too much detergent or soap. (4 – 10)

Identify and chart areas in the school and home where water is used e.g. drains, gutters, down pipes, sprinklers, tap, showers, laundries, rainwater tanks, toilets, drinking fountains. (4 – 10)

Discuss environmental issues that arise from our use of water. Draw 'cause and effect' flow charts to illuminate the issue and its effect on coastal area. (5 – 10)

For example:

drains → blocked with leaves and litter → mini flooding in school grounds and after draining away pollutes coastal areas

Talk with students about litter and urban and agricultural run-off that washes into watercourses and drains. Follow its path to the sea. (4 – 10)

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Brainstorm ways the class could get involved in activities for the protection of our waterways and the sea. (4 - 10)

Develop community links with others in your area concerned about water issues. Contact your local Waterwatch Co-ordinator Office. (4 - 10)

### Future perspectives

#### Activities linked to grade levels 5 - 10

Students select an issue they consider has affected a coastal area. Students write the issue in the centre of the circle and then surround this circle with three additional concentric circles, each slightly bigger than the other. (5 – 10)

Students identify first, second and third consequences of the issue – one per outer circle.

and/or

In groups, older students might discuss and record why they think it is important to find out about the sea and its resources, both now and in the future.

Ask these questions:

- What present and past patterns of use can you see when you look at the sea and coastal areas?
- Do you think the sea and coastal areas are being used sustainably? Will your grand children still be able to enjoy these environments as you do?
- What do you think we have to do to ensure that the sea and coastal areas will be used sustainably in the future?
- What types of resources do you think the sea and coastal areas will and won't be able to provide if we continue to manage them in the same way as we do now?

With older students, introduce the concept of *sustainable coastal management* or *ecologically sustainable development*. In their groups, students consider a range of questions (see below) and prepare an 'effects wheel' to illustrate their preliminary thoughts about the issue:

- If vast areas of the sea are affected by human activity, what might this mean in the future?
- If we continue to strive for a balance between our present need for resources while conserving and protecting natural areas for the benefit of future generations, what might this mean for the future?
- What we do at home has implications for the sea.

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### Imagining the future

#### Activities linked to grade levels 5 - 10

Ask students to imagine what the environment of the sawfish and the coast where they live might look like when they are adults.

Ask students to illustrate possible changes to these places and the sawfish that could occur between now and when they become adults:

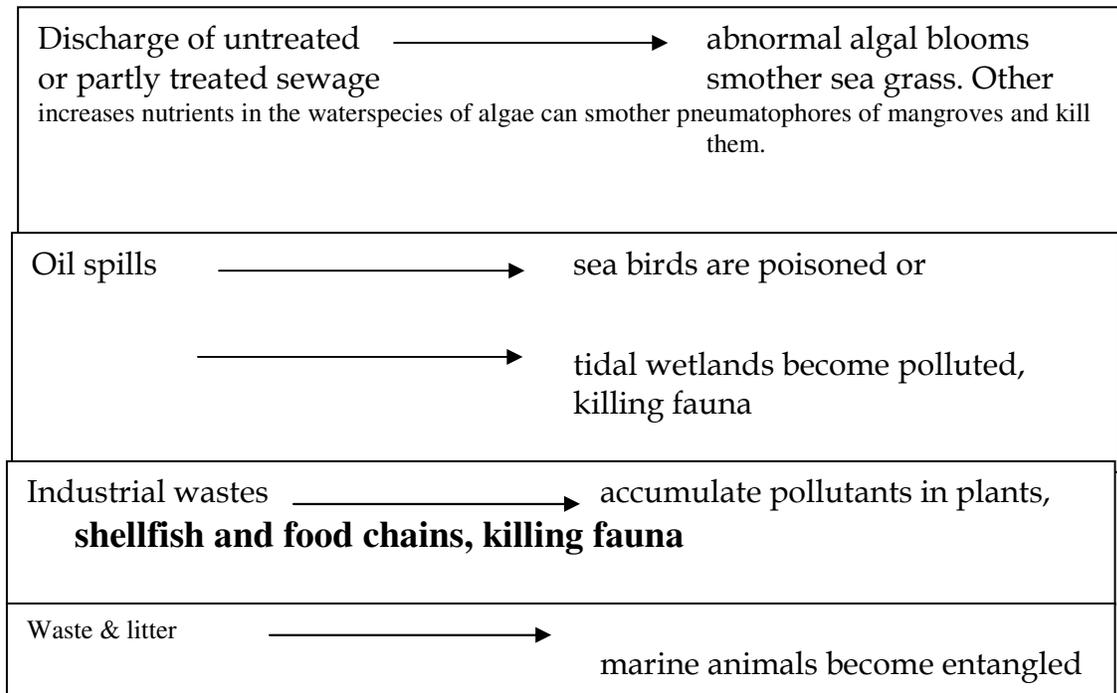
- What changes do you think might occur? Consider boating activity, shell grit production and over-fishing, pollution of an area that has been 'loved to death,' and the effects of increasing human population on the coast.
- What might these places look like in the future? Why?
- What new trends might emerge?

### Identifying problems

#### Activities linked to grade levels 6 - 10

Revisit students' understanding as a starting point for investigating water issues affecting the sawfish and the marine environment in which it lives. Draw a 'cause and effect' flow chart to show the issue and its effects.

For example:



Give groups of students an issue that affects the sea, coast, marine and tidal plants, animals or sawfish

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### Share understanding

Activities linked to grade levels 5 - 10

As a class, suggest ways we can ensure people look after the sea. Students could:

- Contribute a class article for the school newsletter (5 – 10)
- Prepare a display of special places and features of the sea and invite other classes and/or parents to view it and ask questions (6 – 10)
- Speak to other classes about the use and care of the sea (6 – 10)
- Make a poster to advertise the use and care of places. (5 – 10)

### Get involved in Water watch

#### Activities linked to grade levels 5 - 10

Waterwatch is a national community-based water-quality monitoring program that encourages community groups to regularly monitor the quality of water in their local waterways. Using information gathered from this program, encourage groups of students to develop community action plans to help overcome any of the problems they may find. Form a Waterwatch group, and design a water sampling and monitoring program.

### Problems and solutions

#### Activities linked to grade levels 5 - 10

Encourage groups to choose one local issue associated with the long term future of the sawfish and other threatened species that live in Australian waters.

These might include:

Solid waste	recreation	over-fishing
Sewage	vegetation removal	agricultural chemical run off
heavy metals	pesticides	Pollution
Oil pollution	industrial wastes	

List possible solutions to each problem and the reasons students think something should be done about them. Discuss what the class could do.

Suggestions might include:

- Raising public awareness by speaking at a school assembly, writing an article for the school newsletter, or writing a letter to the editor of a newspaper;
- Developing an action chart to show how students and their families can act appropriately when visiting marine areas;
- Writing to Members of Parliament at the State or National levels about coastal and marine issues that concern them;
- Encouraging care givers to cover trailers and secure things that could be blown away while being transported e.g. rubbish being taken to the landfill or transfer station;
- Raising community awareness about fixing oil and radiator leaks and washing cars where the suds soak into the ground rather than running into the drain;
- Sweeping local street gutters and composting to prevent leaf litter contaminating our storm water and entering coastal waters;

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- Raising community awareness of the two separate systems which carry water away from homes (i.e. wastewater and storm water systems), and empowering them to dispose of things correctly;
- Putting litter in the bin and cleaning up after dogs;
- Raising community awareness about dry sweeping driveways, mopping up oil spills and putting waste in a bin;
- Being "green" consumers when shopping and thinking about the effects of purchases on our coastal and marine environment; and
- Supporting others to make informed decisions about what can, and cannot, be disposed of safely at home.

### **Get involved**

#### **Activities linked to grade levels 5 - 10**

Join the Marine and Coastal Community Network or Threatened Species Network. Become involved in activities to conserve and manage the marine and coastal areas. Alternatively, investigate involvement in the MESA Coasts and Marine Schools Project. See <http://www.mesa.edu.au/>

### **Reflection**

#### **Activities linked to grade levels P - 10**

Ask students to complete a self-assessment and reflection activity using the following questions:

- What is the most important thing I have learned about the species living in marine areas? (P – 10)
- What is the one thing I have learned about myself and how I might treat marine environments? (5 – 10)
- What can I do at home to protect places these and the animals that live within them? (P –10)
- What would I still like to find out about the sawfish and similar threatened species? (P –10)
- With which piece of my work am I most satisfied? Why? (5 – 10)

### **Identifying emerging issues**

#### **Activities linked to grade levels 5 - 10**

Following a period of reflection, students could engage in group discussions about how to deal with unresolved questions, and initiate a further investigation.

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### Setting a task

#### Activities linked to grade levels 5 - 10

Explain to the class that in groups their task is prepare either a multi-media presentation, a report or a brochure which conveys detailed information about the:

- Current use;
- Distribution;
- Biodiversity;
- Future uses; and the
- Management of Queensland's Great Barrier Reef and coastal zones.

### Futures perspectives

#### Activities linked to grade levels 5 - 10

Students in groups discuss and record why they think it is important to find out about the sawfish, both now and in the future.

Ask these questions:

- Why do you think this study could help you in the future?
- What patterns can you see when you look at how the sawfish has been impacted on now and in the past?
- Do you think the sawfish will live sustainably in the future?

Introduce the concept of *sustainable management*. In groups, students consider one or all of the following questions, and prepare an 'effects wheel' to illustrate their preliminary thoughts about the issue:

- If we find a balance between meeting our present needs for resources while conserving natural resources and protecting the environment for the benefit of future generations, what might this mean for the future?
- If technology enables us to access the sea more easily, what might this mean for the animals within it and their surroundings?
- Discuss how to put a monetary 'value' on the resources and services provided by the marine environment.
- If we impact on vast areas of sea globally, what are the implications for feeding and breeding areas for fish and crustaceans, or the world's climate?

Groups report back to the class and record their findings for later class work. Students then compare ideas, identifying similarities and differences, and discussing differences of opinion.

### How and why have sawfish numbers changed?

#### Activities linked to grade levels 5 - 10

Working in small groups, students describe how and why the sawfish numbers have changed over time.

Students discuss some of the possible reasons for of the reduction of Queensland's sawfish, for example loss of habitat and the effect on water quality.

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### **Opinion poll**

#### **Activities linked to grade levels 6 - 10**

Students develop a survey to gauge the opinions of Australians about the sawfish. Survey questions could relate to issues such as:

- The value of sawfish;
- Whether respondents have seen a sawfish;
- What people like or dislike about sawfish;
- Why (and/or whether) they think these species are important for their lifestyle or economy;
- Suggestions about initiatives they would like to see happen related to the survival of sawfish (which could include 'no human activity');
- Marine management priorities respondents believe should be implemented;
- People they believe should be responsible for undertaking these initiatives and for looking after the sawfish in the future; and
- What could be done to protect sawfish?

### **Opinion poll analysis**

#### **Activities linked to grade levels 6 - 10**

Groups of students analyse the results of their opinion poll. They collate responses to each question and decide how best to present findings, using tables, bar or pie diagrams, graphs, charts or lists.

### **Compass rose**

#### **Activities linked to grade levels 6 - 10**

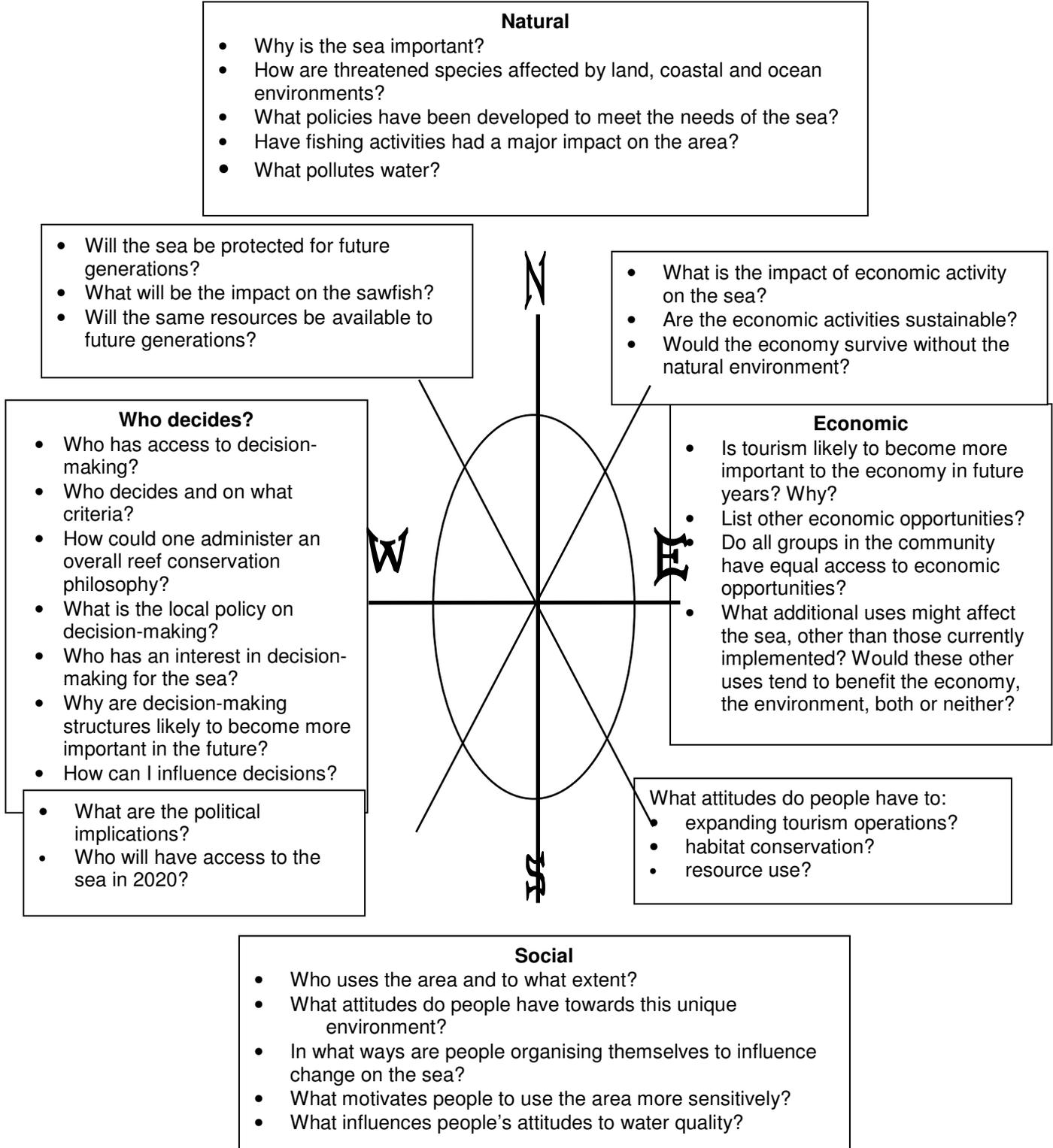
Introduce the compass rose as a simple tool to enhance thinking about issues.

As a class, talk about each axis and what each compass point represents. Discuss diagonal points and the questions these imply.

Talk about the environmental, social, economic and political factors that influence the various ways in which the sea's resources are valued. Taking each axis in turn, record questions about which class members would like to know more.

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For example:



Explore the statement "Managing the sea for the future." Brainstorm a list of ideas. Identify key questions for each of the compass rose points and the diagonal points (NE, SE, SW and NW).

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Focus on the issues and questions raised and after using the compass-rose process ask students to:

- Contact community groups, industries, agencies, government departments and groups who are working for change through managing marine environments like those in which sawfish live and promoting their sustainable use.
- Design community information fact sheets, brochures or pamphlets that advocate actions that everyone can take to bring about the sustainable use and protection of sawfish.

### **Get involved**

#### **Activities linked to grade levels 5 - 10**

Using responses from the earlier activity encourage students to develop ideas on how they might get involved. Suggestions could include:

- Prepare a design proposal that promotes recreational values or enhances awareness of the value of the flora and fauna of the sea.
- Develop an innovative marketing campaign to inform people about recreational activities available on Australian waters.

Students evaluate the suggestions, deciding which ones can be practically undertaken. They establish a timeline and monitor progress in achieving their goals.

### **Act on the information**

#### **Activities linked to grade levels 5 - 10**

Encourage students to act on the information that they have discovered in the course of their investigation. Some appropriate forms of action could include:

- Communicating their conclusions to other classes, community members, relevant organisations, and/or politicians, or
- Developing information brochures, or
- Mounting a display in a prominent community setting such as a library, or
- Taking economic action by not purchasing certain goods or services to protect the marine environment from pollution, or
- Mounting an art exhibition based on a sea theme.

## **MESA Seaweed 2008 "Extinction – a Saw Point"**

### **Reflection**

#### **Activities linked to grade levels 5 - 10**

Encourage students to:

- Check to ensure the original questions around the compass rose have been answered.
- Discuss the main opportunities or obstacles to obtaining information.
- Write an account of the research work or produce a flow chart identifying strengths and weaknesses uncovered.
- Reflect on how (or whether) the research changed students' individual perceptions of the use and value of coastal areas with coral reef forests and samphire areas and their management.

### **Using an Aboriginal and Torres Strait Islander perspective**

#### **Activities linked to grade levels 5 - 10**

Understanding the way Aboriginal and Torres Strait Islander people have lived on and with the sea for tens of thousands of years is critically important. Develop an understanding of issues and knowledge of the strategies Aboriginal and Torres Strait Islander people used to address them, by inviting Aboriginal and Torres Strait Islander community members into the classroom. Some of these activities can be chosen to highlight this perspective.

Invite an Aboriginal and Torres Strait Islander parent to visit and talk to the class about traditional use of the sea. (5 – 10)

Read some Dreaming stories that highlight the importance of these to the Aboriginal and Torres Strait Islander people. Discuss the close relationships between Aboriginal and Torres Strait Islander people and the sea and how the relationship to the natural world carries responsibilities for its survival and continuity. (5 – 7)

Find out about local Aboriginal and Torres Strait Islander Dreaming stories related to the sea. Invite Aboriginal and Torres Strait Islander parents to the classroom and

- Relate ways Aboriginal and Torres Strait Islander people got their food supply and looked after it on the sea
- Talk about way Aboriginal and Torres Strait Islander people used water, animals and plants
- Identify animals used by Aboriginal and Torres Strait Islander people making connections with how they might be used in the future (5 – 10)

Create a mural showing life on the reef before European contact, highlighting water, plants, animals, soil and people, and the interactions between them (5 – 10)

Based on what you have been told, write stories about Aboriginal and Torres Strait Islander peoples' traditional sea use and catchment care (5 – 10)

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### Using a futures perspective

#### Activities linked to grade levels 4 - 10

It is natural that students be concerned both about the current state of the sea and about its future. They will become aware that many related issues, and not just the environment, affect their lives now, and that the future for the sea holds both promise and threat.

Ask the students individually to write down five questions they would like to ask about the future of the sea. Ask students to form groups to categorise similar questions and rank them in order of importance. For example, 'Our class's questions about the future of the sea' (6 – 10)

Develop futures wheels by writing an idea in the centre of a blackboard, or on an overhead transparency or on butcher's paper. Around the futures ideas, write all the things that might happen if the idea came to fruition. Continue adding things that might happen. (6 – 10)

An extension of this might be to decide on an issue and ask the question:

- What are the immediate consequences? Discuss these. Using the futures wheel, examine those effects that might be due to technological innovation and those that result from intended or unintended actions. (6 – 10)

#### Consider the past

Ask students to speculate about the past in which their grandparents may have lived and to address the following sorts of questions: (4 – 10)

- What do you think the sea was like five years ago?
- What might the sea have been like hundreds of years ago?
- How might the sea have become as it is now?
- What might be the most important influences on the lives of the sea's animals and plants?
- What might be some of the important events that have happened to this part of the sea?
- Consider the impacts of a range of past scenarios that might have affected the sea such as an ice age, or an outbreak of Crown of Thorns sea stars.

#### Back to the future

Encourage students to talk or write about their own projections of possible diverse futures for the sea. (4 – 8)

From the possible futures, agree on those that are probable and preferable. List the steps that could be taken to make those futures eventuate. (4 - 8)

Discuss some of the areas over which we have control in contributing to the sea's future. (4 – 10)

Use a timeline to record changes to the sea through historical time. (4– 8)

Discuss how decisions and actions taken by one person might affect the sea. (4-10)

Ask students to provide examples of simple or complex decisions and their consequences. (4 – 10)

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### **Probable and preferable futures**

#### **Activities linked to grade levels 7 - 10**

Using a timeline, describe the sea of today. (7 – 10)

Ask students to consider and discuss in pairs what changes are likely to take place in the waters of the sea. Follow this by discussing students' aspirations for the future of the sea. Introduce the terms **probable** and **preferable** future. Using the time line technique, ask students to use words, symbols, pictures and colours to explore their expectations for a likely future for the sea and contrast these ideas with their preferred future for the sea. (They may not differ) (7 – 10)

Display time lines for the class to examine and compare. Ask students to make brief presentations and answer questions about their views, hopes and visions for catchments that feed into the sea. (7 – 10)

Explore similarities and differences between students' preferred futures of the sea. Decide on a collective class picture of a preferred future for a local part of the sea near where the students live. Consider who or what might benefit most from this future. Consider who might be responsible for making decisions to deliver the preferred future, and how they, as future citizens, could be involved in decision-making. Consider whether anyone or anything might miss lose out. (7 – 10)

Examine events or trends in the local catchment at present that seem to support preferable changes. Consider what individuals, can do to assist such changes to come about. (7 – 10)

### **Images of the Sawfish in the Future**

#### **Activities linked to grade levels P - 7**

Playing relaxing music in the background, encourage students to close their eyes, relax and venture on a journey into the future. Encourage students to visualize the sawfish in the sea in the year 2030 and to draw, paint sketch or make a model of this image. (P – 7)

Ask students to share their creations in pairs or small groups. Create a display for others to view and enjoy. (P – 7)

### **Coastal Related Activities**

#### **Activities linked to grade levels 5 - 10**

##### **Changing Shoreline**

Make a 20<sup>th</sup> Century timeline showing changes to the Australian coastline. Discuss how these changes have occurred. (6 – 10)

Interview older family members about their memories and recollections of the coast or seashore. Ask questions about how they feel about the seashore and changes that have taken place in the coastal landscape. (5 – 9)

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Collect photographs from family members, libraries or historical societies. Identify changes to the coastal landscape and consider the factors that have caused these changes. (5 – 7)

Think about, list and chart the consequences of changing the landscape. (5 – 7)

Encourage testing and re-evaluation of values. Talk about the role of society in making changes to the coastal landscape. Identify some of the changes. Discuss the effect these changes might have had on the landscape. Consider whether the changes are permanent or temporary. (7 – 10)

Discuss changes students can make to the seashore environment, both good and bad. Discuss whether the changes are permanent or temporary. Describe solutions that might stop or reverse the negative effects of human activity on the coastal seashore landscape. Discuss what the individual, class, family, and community can do to work in harmony with the coastal environment. You might like a visit a coastal area to help students think about the changes that are happening. (5 – 10)

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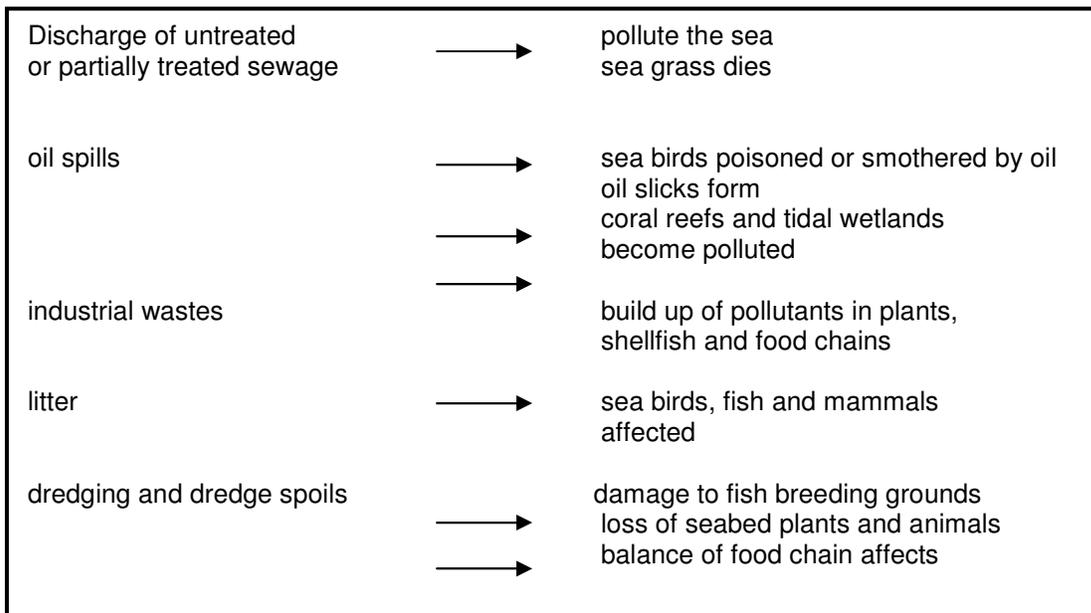
### Global Ocean Activities

#### Activities linked to grade levels 4 - 7

Viewed from space, we can see that the oceans and seas dominate our planet, covering more than 70% of Earth's surface. Many have described Earth as the "Blue Planet" or the "Global Ocean." Oceans play an important part in controlling climate and weather, as well as providing us with food, energy, minerals, routes for communication and transport, and, of course, a large area for recreation. The oceans and their wildlife have provided us with myths and legends, and subjects for painting, music and poetry. However, most people rarely consider how they benefit from the oceans and why it is necessary that we should all be concerned for their future.

Visit the sea, find photographs and pictures, or view videos of the sea. Ask students to record their personal responses by describing, for example, the beauty, colour, special qualities, sounds, taste or smell of the sea. (4 – 7)

Discuss where on our planet oceans are facing problems. List the different types of problems. Discuss environmental issues connected with our seas and oceans. Draw cause and affect flow charts to show the issue and the problem. For example, provide students with an issue and in groups let them work out effects on sea and coast, sea life, sea plants, fish, marine mammals and seabirds. (4 – 7)



Talk about the power of knowledge and understanding. Discuss how people can make a difference once they understand an issue and how they can influence change. Share specific examples. (6 – 7)

Discuss the saying:

'Tell me and I will forget it,  
Show me and I may remember,  
Involve me and I will understand.'

Relate the saying to concerns for the marine environment.

## MESA Seaweed 2008 "Extinction – a Saw Point"

Devise a list of actions everyone can take to care for our coasts, oceans and the marine environment.

For example:

What can you do to help

Show your concern for the marine environment by acting in a responsible way: (4 – 7)

- Understand that individual actions have an impact on the environment.
- Cut down on the amount of plastic used. Reuse and recycle plastics.
- Do not dispose of plastic or sanitary items down the toilet.
- Choose 'green' products and consume less.
- Never dispose of oil or oil based products or chemicals down the drain.
- Don't buy products with excess packaging that cannot be reused.
- Don't dump litter or fishing gear from boats. Sort wastes on board for appropriate disposal or reuse on shore.
- Sweep street gutters (but not down the drain) and use leaf litter to mulch gardens.

### Ocean Pollution Activities

#### Activities linked to grade levels 4 - 10

The oceans receive large volumes of human waste, which is either deliberately dumped in the sea, or as run-off from the land. At least 83% of all marine pollution derives from land-based activities. Run-off from agriculture and urban centres, industries and individual human actions contribute to pollution in rivers. Vast amounts of waste are flushed downstream and deposited in estuaries and coastal zones.

To study and discuss this, choose from the following activities.

- Predict the materials, both natural and manufactured, that might be found in and along a waterway. Group the predicted materials, such as manufactured objects, natural objects, plants and animals. Manufactured materials can be further categorized by type e.g. glass, metal, wood, paper, plastic, and by their ability to be reused or recycled. Technically, manufactured materials are not wastes if they can be reused or recycled: they are resources. However, in or alongside a waterway, they're definitely in the wrong place. (3 – 9)
- Participate in a survey of a waterway near your school. Name and classify the groups of objects found in the survey, e.g. manufactured objects – plastics, bottles, cans; natural objects – leaves, banks, fruit, and waterweeds. Trace the path of one of the manufactured objects from the factory to the waterway. (5 – 9)
- In small groups, consider how
  - Storm water drains,
  - Irrigation outlets,
  - Cleared land on river banks,
  - Grazed land near a water way,
  - Gullies,
  - Effluent pipes, and
  - Eroded riverbanks

could directly or indirectly contribute to the quality of water.

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Water quality is affected in a variety of ways, such as when eroded soil is carried by streams or run-off into the waterway making the water muddy. Mud reduces light and oxygen for water life and makes the water unsuitable for drinking. Cleared and irrigated land may cause salts in the soil to rise to the surface and enter waterways causing the water to be saltier and of lower quality. Sediment causes silting and interferes with the flow of water, forcing rivers to cut into banks. This pollutes oceans and seas. (5 – 9)

Visualize discharge points and drains emptying into the sea along the Great Barrier Reef. Imagine collecting a water sample, or visiting the beach after a rainstorm. Imagine the colour of the sea. Brainstorm a list of words to describe the water. (5 – 9)

Make predictions about whether aquatic animals and plants could live and breed in such water. (5 – 9)

Discuss your predictions. (5 – 9)

Brainstorm and implement ways to improve the quality of watercourses, such as immediate clean up, long-term prevention of pollution through education, litterbins, and improved waste management programs. (4 – 10)

Invite representatives from local government or other agencies to visit and discuss what we can do to help reduce the pollution of our watercourses. Prepare questions for the speaker(s). (4 – 10)

Use key questions of geography to support students to structure a research assignment on an issue affecting Sawfish. For example: (5 – 10)

- What is the issue?
- Where is the problem?
- How is it caused?
- What are the solutions?

Support students to understand the issues by focusing on questions like: (5 – 10)

- Is this issue a concern to society? Why?
- What parts of society have an impact on this issue?
- What are some community perspectives on this issue?
- How has the issue developed over time?
- What do we really know about the issue?

Place resources for answering these questions in a learning centre. Encourage students to investigate a seawater quality or pollution issue. In pairs or groups, students could frame questions such as: (4 – 10)

- What are the different ways in which seawater can be polluted?
- Where do they occur?
- Why do they occur?
- What are the consequences?
- What are the solutions?
- What are the alternatives?
  - Are they viable alternatives?
  - What are the economic, social, environmental and health consequences of these alternatives?
- How can I find out more about this issue?

## MESA Seaweed 2008 "Extinction – a Saw Point"

- How can I judge the reliability/validity of the information I receive on this issue?
- How can I draw together a range of points of view on this issue?

Assist the students to make decisions about seawater quality and pollution issues by

exploring questions like: (6 – 10)

- Is it possible to resolve the issue?
- What are the options for dealing with this issue?
- Who benefits and who is disadvantaged by these options?
- What options for action do I consider are most appropriate in relation to this issue?
- Who, or what, would be affected by these actions. How would they be affected?
- How can individual get involved to protect marine resources

Ask students in small groups to present a 15-minute report to the class on a seawater quality or pollution issue, which has been researched, investigated and analysed by the group. (6 – 10)

Using maps, diagrams and headings, prepare reports on seawater quality and pollution, or sustainable land and marine management, for a school bulletin board. (6 – 10)

### Stormwater Pollution Activities

#### Activities linked to grade levels 3 - 10

Bitumen, concrete and buildings seal much of the ground in cities and urban areas. This has major and far-reaching effects on local hydrology. When it rains, most water flows down storm water drains into creeks, rivers and ultimately, the sea. The volume of rainwater absorbed by soils in urban areas is dramatically reduced and there is less vegetation to use and retain it.

Take a walk around the local area. View the street gutters and describe what can be found there: litter, soil, dog faeces, or leaves, for example. (3 – 10)

Sweep nearby street gutters. Sort and classify what is found. Weigh the sorted waste and, using percentages, calculate the ratios of what actually makes up the waste. For example, in my street 36% of the waste was leaf litter, 10% was plastic products, 1% was dog faeces. Illustrate findings using a graph, such as a pie, column or bar graph.

**Important note:** Take health precautions by wearing gloves and use metal tongs to pick up sharp objects. (6 – 10)

Sample the same gutters over a week and multiply by 52 to calculate the amount of waste from your local street that may end up on the coast during the course of a year. (6 – 10)

Using the information obtained from this study, consider the consequences for human health and the environment, and discuss how problems can be avoided or eliminated. (6 – 10)

Take into account the varying waste materials that end up in the area and investigate their impact on the marine environment. Consider how long the waste persists in the environment. Share the results. (6 – 10)

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### Spread the Word

#### Activities linked to grade levels 2 – 5

Management of Australia's waters by government, concerned groups and individuals, is important if we are to conserve this natural environment. We must use resources wisely to ensure that we both protect and obtain the maximum benefits from these ecosystems.

Choose some concluding activities from the following: (7 – 10)

Talk about the meaning of 'ecological sustainability.'

Discuss why people need to recognize the importance of:

- Environmental stewardship and conservation
- Good water quality
- Biological diversity

Consider the issues that have been explored and their effect on the sustainability of our natural environment and its resources. (6 – 10)

- Draw cause and effect charts to show links between issues, actions and the sustainability of our environment.
- Visualize a sustainable environment. Sketch the elements within it.

Think about the preferred and probable futures for Australia's waters illustrate these and share understandings with the class. (5 – 9)

Consider the issues that have arisen and suggested ways of informing the local community. For example, publish suggested actions and distribute them to families in the school, councils, libraries, banks and supermarkets. (4 – 7)

Publicize incidences of pollution. Contact the Environmental Protection Authority and write letters to the editor, contact media representatives, set up displays, and give presentations to community groups. (5 – 10)

Design educational materials on the use and care of marine environments. For example, a brochure with: (5 – 10)

- A map showing the location of a local marine environment
- Description of the landscape
- Major plant and animal species found in the area
- Special features, such as walking tracks, rare organisms, educational facilities
- Activities that can be undertaken in the area
- Regulations that relate to the area
- Environmental problems faced in the area
- Strategies for individuals to protect and improve the environment