

Seaweed Solutions for Sustainable Futures

Teacher Guide



Coastcare Victoria School Kit



Coastcare
Victoria



Energy,
Environment
and Climate Action

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Acknowledgment

We acknowledge and respect Victorian Traditional Owners as the original custodians of Victoria's land and waters, their unique ability to care for Country and deep spiritual connection to it. We honour Elders past and present whose knowledge and wisdom has ensured the continuation of culture and traditional practices.

We are committed to genuinely partner, and meaningfully engage, with Victoria's Traditional Owners and Aboriginal communities to support the protection of Country, the maintenance of spiritual and cultural practices and their broader aspirations in the 21st century and beyond.



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Contents

Curriculum links	1
Key Themes:	3
Learning intentions	4
Success Criteria.....	4
Background.....	4
Resources	5
Other useful external links:	5
Lesson Plan:	6
Activity 1: Quiz.....	6
Activity 2: Local language	6
Activity 3: Seaweed biodiversity	6
Activity 4: Future Job Profile.....	6
Investigation 1: Modern Uses of Seaweed.....	7
Investigation 2: International Use of Edible Seaweeds	8
Review Questions.....	8
Glossary	9

Curriculum links

Year 5 and 6 Curriculum Area	C/ Code	Content Description	Elaboration / Link to this lesson/ Learning intentions.
Science/ Science understanding > science as a human endeavour	VCSSU073	Scientific understandings, discoveries and inventions are used to inform personal and community decisions and to solve problems that directly affect people's lives	Investigate several case studies to research modern uses of seaweeds and their benefits
Intercultural Capability / Cultural Practices	VCICCB010	Explain how intercultural experiences can influence beliefs and behaviours, including developing a critical perspective on and respect for their own and others cultures	Understanding Aboriginal Australians have had a long history of using seaweed for a diverse range of uses Many cultures around the world have had a long history of consuming seaweed in their cuisine
History / Historical Knowledge / Australia as a nation	VCHHK096	Significant contributions of individuals and groups, including Aboriginal and Torres Strait Islander peoples and migrants, to changing Australian society	Understanding Aboriginal Australians have had a long history of using seaweed for a diverse range of uses
Victorian Aboriginal Languages / Understanding / Systems of language	VCLVU163	Distinguish and produce the speech sounds of the language, understanding how these are represented in writing	Research and record Aboriginal Language for 5 words and represent the sounds of these words phonetically in writing.

Year 7 and 8 Curriculum Area	C/ Code	Content Description	Elaboration / Link to this lesson/ Learning intentions.
Science/ Science understanding > science as a human endeavour	VCSSU090	Science and technology contribute to finding solutions to a range of contemporary issues; these solutions may impact on other areas of society and involve ethical considerations	Investigate several case studies to research modern uses of seaweeds and their benefits

Science / Biological Sciences	VCSSU091	There are differences within and between groups of organisms; classification helps organise this diversity	Use the Port Phillip Bay Taxonomy Toolkit to find similarities and differences between main seaweed groups.
Intercultural Capability / Cultural Practices	VCICCB013	Analyse the dynamic nature of own and others cultural practices in a range of contexts	Comparing cultural use and affiliation to seaweeds locally and internationally Many cultures around the world have had a long history of consuming seaweed in their cuisine
Critical and Creative Thinking > Reasoning:	VCCCTR037	Investigate when counter examples might be used in expressing a point of view	Investigate how Aboriginal groups should be consulted for emerging seaweed industries.
History / Historical Knowledge / Aboriginal and Torres Strait Islander peoples and cultures	VCHHK107	The nature of sources of evidence about ancient Australia and what they reveal about Australia's ancient past, such as the use of resources.	Understanding Aboriginal Australians have had a long history of using seaweed for a diverse range of uses
Civics and Citizenship /Citizenship, Diversity and Identity	VCCCC027	Examine how national identity can shape a sense of belonging and examine different perspectives about Australia's national identity, including Aboriginal and Torres Strait Islander peoples' perspectives	Explore the role seaweeds and the Great Southern Reef could play in the future of Australia's identity.
English	VCELT404	Explore the interconnectedness of Country and Place, People, Identity and Culture in texts including those by Aboriginal and Torres Strait Islander authors	Understanding Aboriginal Australians have had a long history of using seaweed for a diverse range of uses

Cross Curriculum Priorities	C/ Code	Content Description	Elaboration / Link to this lesson/ Learning intentions.
Sustainability > Futures		Sustainable futures result from actions designed to preserve and/or restore the quality and uniqueness of environments.	Investigate several case studies to research modern uses of seaweeds and their benefits Analyse and interpret job profiles to dream up future careers and career pathways
Sustainability > Futures		Actions for a more sustainable future reflect values of care, respect and responsibility, and require us to explore and understand environments.	Investigate how Aboriginal groups should be consulted for emerging seaweed industries
Sustainability > Futures		Promoting reflective thinking processes in young people and empower them to design action that will lead to more a more equitable and sustainable future	Investigate several case studies to research modern uses of seaweeds and their benefits Analyse and interpret job profiles to dream up future careers and career pathways
Sustainability > Systems		All life forms, including human life, are connected through ecosystems on which they depend for their wellbeing and survival.	Using the Great Southern Reef as an example of an interconnected kelp forest ecosystem with golden kelp providing a range of benefits to people and the environment.
Sustainability > Systems		Sustainable patterns of living rely on the interdependence of healthy social, economic and ecological systems	Explore the role seaweeds and the Great Southern Reef could play in the future of Australia's identity.

Key Themes:

Seaweed biodiversity and classification, modern and traditional uses of seaweeds, sense of place and identity, international use of seaweed, sustainable futures.

Learning intentions

Students will understand:

- There are three main groups of seaweeds (brown, green and red).
- Australia has the highest diversity of seaweeds in the world.
- Aboriginal Australians have had a long history of using seaweed for a diverse range of uses.
- There is an emerging and growing seaweed industry in Australia.
- Many cultures around the world have had a long history of consuming seaweed in their cuisine.

Success Criteria

Students are able to:

- Research and record Aboriginal Language for 5 words and represent the sounds of these words phonetically in writing.
- Use the Port Phillip Bay Taxonomy Toolkit to find similarities and differences between main seaweed groups.
- Investigate several case studies to research modern uses of seaweeds and their benefits.
- Use specific examples to demonstrate how various seaweed species are used around the world.
- Analyse and interpret job profiles to dream up future careers and career pathways.

Background

In Australia seaweed has long been overlooked. Often dismissed as just something smelly and unsightly that washes up on the beach, to this day seaweed is undervalued and underappreciated by most Australians. Historically it has been documented that Aboriginal Australians used seaweed for a wide range of purposes including food, medicine, building material, clothing and ceremonial purposes. In recent times seaweed has started to gain recognition in modern Australia for its broad range of benefits and uses for humans and the environment.

Seaweeds help to clean and de-acidify our oceans through absorbing nutrients and CO₂ via photosynthesis. Seaweeds grow faster than land-based plants because the whole organism photosynthesises. It is well documented that seaweeds have enormous nutritional benefits when consumed (learn more [here](#)).

Australia has the highest diversity of seaweeds in the world, most notably across the southern half of the continent (the Great Southern Reef) which also supports the highest rates of endemism of seaweeds. Seaweeds are algae and there are three main types of algae which may also be seaweeds; these are brown, red and green.

One particular species of brown seaweed, golden kelp *Ecklonia radiata* is the main habitat forming species across southern Australia, dominating 8,000km of coastline. Its presence on rocky reefs supports the growth of many other species by providing food, nutrients and shelter.

The video features four women who all share a passion for seaweed. 2021 NAIDOC award winner, **Aunty Judy Dalton Walsh** is working towards bringing Wadawurrung language back into the region through teaching those young and old. **Zoe Brittain** is an environmental anthropologist and PhD student at Deakin University, Warrnambool. Her research areas of interest include Indigenous knowledge of seaweeds in Australia and issues of equity and Indigenous rights in the developing Australasian seaweed industries. **Dr Prue Francis** is a Senior Lecturer in Marine Science and the Course Director of the Bachelor of Marine Science at Deakin University. **Lichen Kelp** is a performance chemist, sculptor and founder of the Seaweed Appreciation Society International.

Resources

- Video link
- Seaweed video transcript
- Quiz
- Profile pages
- Local Language Worksheet
- Seaweed Biodiversity Worksheet
- Modern Uses of Seaweed Investigation worksheet
- International Use of Edible Seaweed worksheet
- Seaweed Review Questions
- Seaweeds Glossary

Other useful external links:

- [Map of Indigenous Australia](#)
- [Sea Forest Australia](#)
- [Phycohealth: Health benefits of seaweed](#)
- [Nopla](#)
- [Supplementary Video: WWF - Seaweed](#)
- [Supplementary Video 2: BBC - The Unique Power of Australian Seaweed](#)
- [Supplementary Video 3: Why Demand for Seaweed is about to Boom](#)
- [Seaweed Festival Podcast](#)
- [Great Southern Reef website](#)

Lesson Plan:

Activity 1: Quiz

After watching the video complete the Seaweed Solutions for Sustainable Futures Quiz.

Activity 2: Local language

Aunty Judy welcomed us to the video explaining that the video was being filmed on Wadawurrung country and she grew up on Gunditjmara country.

In this activity, students will use the [Map of Indigenous Australia](#) to research the Traditional Owners of the land they are learning on today and then use the Local Languages Worksheet and go to the [50 words project website](#) to record 5 words in the local Indigenous language. The website has buttons to be able to listen to the pronunciation of the words and in the final step the students can write down the words phonetically (how it sounds to them).

1. Hello
2. Let's go
3. Fish
4. Water
5. Sky

Activity 3: Seaweed biodiversity

Australia is a global hotspot for seaweed biodiversity. Across the Great Southern Reef there are almost 1500 species. Seaweeds are algae and there are three main types of algae which may also be seaweeds; these are brown (Ochrophyta), red (Rhodophyta) and green (Chlorophyta).

In this activity students will use the [Port Phillip Bay Taxonomic Toolkit](#) to research local species. In the species tab, if students click [Seaweed and Seagrasses](#) they can then explore some of the local species found in Port Phillip Bay and nearby areas. Students will use the website to fill out the Seaweed Biodiversity Worksheet, finding specific information from one species from each of the three groups.

Part II: In the video Zoe mentioned *"I often think a part of Australia's natural identity, you can often see reflected in a lot of our tourism or resource marketing. And part of that is being beach lovers who have a beautiful, natural, clean environment. And I think it's quite funny in a way that we're so proud of the natural environment we have but we've never really seem[ed] to expand that to include seaweed"*.

In pairs of groups, students explore the idea that seaweed could be part of Australia's identity. Use the [Great Southern Reef website](#) to explore some of the people, places and marine life of the region. Students may also use the [stock imagery](#) to create a video or flyer to promote Australia's identity as a seaweed superpower.

Activity 4: Future Job Profile

So far in this unit students have been introduced to a number of experts with different jobs relating to the ocean and coasts. In this activity students will look at the profile page articles to gain inspiration for their own future careers. Use the presentation slides to explore some of the profiles. If running this lesson as part of the entire Coastcare unit you can use the full set of profiles featuring people from each of the lessons. Alternatively just use the profiles of Zoe, Prue and Lichen.

If this activity is being run in a class, you may like to divide the class into groups, allocate a profile to each group and then have the group share a few facts about the person. Then students will use the Profile worksheet to dream up a job for their future and answer the following questions:

6. What might you like about this job?
7. Who might be a good mentor?
8. How might you get your job?
9. How could volunteering help your career?
10. How does sustainable thinking impact what you do?
11. Why is having a healthy environment important to you?
12. What are some groups to get involved in to help the environment?

Investigation 1: Modern Uses of Seaweed

Zoe Brittain has been researching the Indigenous use of seaweeds and mentioned in the video a range of uses including diet, building houses, clothing, medicine, and spiritual practices.

The video also introduced many examples of the growing list of modern uses of seaweeds:

- feed to cows
- food for humans
- pharmaceuticals
- making plastic
- clothing

The video also featured footage from a number of organisations including SeaForest, PhycoHealth and Nopla. Each of these companies are utilising seaweed in their unique way to create products.

In this investigation students will visit the organisations' websites and the Modern Uses of Seaweed investigation worksheet to find out what seaweed species are being used, what products are being made and the benefits of these products to people and/or the environment. There is also blank space for students to find another organisation utilising seaweed.

Best link for PhycoHealth is this blog <https://www.phycohealth.com/blogs/news/seaweed-for-the-planet> because it specifically mentions the green seaweed.

Best link for Nopla is the FAQs section for uses <https://www.notpla.com/frequently-asked-questions/> and the Technology section to find the type of seaweed <https://www.notpla.com/technology-2/>

Extension:

With increasing appreciation, knowledge of and use of seaweed in Australia, emerging industries endeavouring to harvest or grow seaweed in aquaculture need to be sensitive to sustainability as well as good environmental practices. Many seaweed species that may be valuable for use are important habitat (including ecosystem engineers). Careful research needs to be undertaken to understand the potential impacts of harvest to prevent negative outcomes to ecosystems.

In reflecting on this activity, discuss the following questions:

Australian Aboriginal people have a custodial responsibility for caring for Country and sustainability managing resources.

- How should Aboriginal Australians be involved/consulted in the emerging seaweed industries?
- Who else should be consulted?

- What negative impacts could occur?

This may be run as a debate between two groups. Groups should investigate counter examples when expressing their point of view.

Extension 2:

Listen to the podcast episode '[Innovative uses of seaweed through history and in the future](#)' and create a fact sheet about seaweed use in Australia.

Investigation 2: International Use of Edible Seaweeds

Many cultures around the world have had a long history of consuming seaweed in their cuisine. In this activity, students will research the various seaweed dishes and species used from around the world.

Use links to the worksheet

Extension: Have students look into Australia's widespread golden kelp *Ecklonia radiata*. How many different modern uses (in food or otherwise) does this species have?

Review Questions

Use the Seaweed Review Questions PDF

Glossary

Algae: simple organisms that live mainly in the water and are able to use sunlight for energy and create oxygen. All seaweeds are algae but not all algae are seaweeds, for example some algae are phytoplankton.

Ancestors: a family member from long ago.

Asparagopsis: a genus of red edible seaweed.

Biodegrade: breaks down into very small harmless parts by the action of living things.

Chlorophyta: green algae phylum.

Climate change: a change in the average conditions (such as temperature and rainfall) in a region over a long period of time.

Ecklonia: a genus of brown seaweed, a kelp with golden appearance.

Identity: the set of qualities and beliefs that makes one person or group different from others.

Kelp: a large brown seaweed that typically has a long, tough stalk with a broad frond divided into strips.

Ochrophyta: one of the three major divisions of algae, including brown algae and diatoms.

Phaeophyceae: the class of brown algae within the phylum Ochrophyta.

Pharmaceuticals: any kind of drug used for medicinal purposes.

Phylum: a group of related organisms that ranks above the class and below the kingdom in scientific classification.

Photosynthesis: the process in which plants and algae use sunlight to make their own food.

Repercussion: a widespread, indirect, or unexpected effect of something said or done.

Rhodophyta: red algae phylum.

Seaweed: large algae growing in the sea or on rocks below the high-water mark.

Traditional Owner: an Aboriginal person with certain rights and responsibilities for land and sea.

Ulva: a genus of green algae collectively known as sea lettuce.