Ngarrindjeri culture embedded in Year 10 Science and History

"Ngarrindjeri culture embedded in Year 10 Science" has 21 lessons covering 5 broad themes

- Rushes, Weaving and Plant Cell Walls
- Plant Databases
- Indigenous Land Management / Biodiversity
- Seeds, Human Nutrition and Germination
- Australian Native Foods: Feeding Australia Sustainably

A complementary Year 10 History resource “Weaving Ngarrindjeri History” includes

- Ngarrindjeri Kaldowinyeri (Creation)
- All things are Connected
- The Stolen Generations
- Weaving: History and Gender
- Waterflows

Lessons are aligned to the Australian Curriculum and educators can share and adapt using Creative Commons share-alike. The science resources include a student activity booklet, a teachers’ handbook and are supported by e-resources such as excel® worksheets and posters. Suggestions are provided on how to adapt the material to other Aboriginal cultures.
Theme A: Rushes and plant cell walls

Overview of Theme A: Rushes and plant cell walls

Cultural context

The cultural uses of rushes are used to highlight the links between man-made items and the biology of a plant cell as well as the importance of connections, both physical and cultural, for strength and resilience.

An introduction to the cultural use of rushes by the Ngarrindjeri people looking at what physical attributes of plants are favourable. This is achieved through species analysis and comparison and practicals which illustrate plant cell wall strength.

Key Concepts

Rushes and reeds are a type of plant where the green tissue or stems come from the ground and do not have leaves.

Stems are made up of many plant cells and each cell has a plant cell wall.

Plant cell walls are made up of many layers, that can make them thick and stiff, or thin and flexible or somewhere in between.

Stems often contain long fibres which can be used to make ropes, nets or even paper. Or the whole stem can be used to make baskets and mats.

Knowing which rush species to use for what purpose requires knowledge and observation skills which you will learn about in three related activities.

Task A1: Cultural connections, rushes

Discover

Cultural use of rushes by Ngarrindjeri people

Understand

Why particular varieties of rushes were selected

Native fibre plants were used by Aboriginal Australians for different purposes, such as making fish traps and basket weaving. An important basket weaving plant for the Ngarrindjeri and Kaurna peoples is the rush Cyperus gymnostachys [C. gymnostachys].

Task A2: Cardboard structure and strength and plant cell walls

Discover

The molecular structure of plant cell walls

Understand

How layers and cross-links contribute to strengths in nature, man-made products and cultures

Cardboard is made of cellulose and has some features of a plant cell wall.

The strength of cardboard and of plant cell walls can be changed by changing the layering, and by the content of each layer.

Task A3: Plant fibres & their uses - weaving with different rushes

Discover

How to make rope from plant fibres

Understand

How man-made fibres are affected by the environment

Remember what Aunty Ellen said about the best rush for weaving:

...it's the three pronged type of fresh water rushes - there's a lot of different types of rushes, this is one that was [S] used because it lasts a long time."

Aunty Ellen Tyndall in Bell (ed.) 2008: 7-8

Task A4: More uses for plant fibres - making rope

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How to make rope from plant fibres

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Video: Reframing Culture [Video](http://vimeo.com/52946877)

watch from minute 11:29 to 12:40

Images from [http://vimeo.com/52946877](http://vimeo.com/52946877), Ellen Tyndall demonstrating weaving and explaining important cultural links

Theme A: For teachers

**Table A1: Themes, connections, rushes and plant cell walls**

<table>
<thead>
<tr>
<th>Title</th>
<th>A1</th>
<th>A2</th>
<th>A3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Culturally relevant, rushes</td>
<td>Cardboard structure and strength plant cell walls</td>
<td>Plant fibres</td>
<td>rush uses - weaving different rushes</td>
</tr>
<tr>
<td>Cultural connections, rushes</td>
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<tr>
<td>Activities</td>
<td>Discover</td>
<td>Understand</td>
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<tr>
<td>Cultural use of rushes by Ngarrindjeri people</td>
<td>The molecular structure of plant cell walls</td>
<td>How to weave</td>
<td>How man-made fibres are affected by the environment</td>
</tr>
<tr>
<td>Discover</td>
<td>Understand</td>
<td></td>
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<tr>
<td>Why particular varieties of rushes were selected</td>
<td>Aborigonal cultural practices ensured the right plants were used for weaving</td>
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<tr>
<td>Task 3</td>
<td>Environmental factors on man-made fibres</td>
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Overview of Theme E: Australian Native Foods: Feeding Australia Sustainably

Modern agriculture relies heavily on monocultures to provide yield benefits and reduced harvesting cost through mechanisation and economies of scale. Plants grown in monoculture of often more susceptible problems such as diseases or insect attack, which can cause dramatic reductions in yield.

Selecting suitable plant varieties that are broadly adapted to Australia’s varied and often harsh environments is an area of ongoing research and innovation. It is part of a world-wide effort to increase the sustainability of agriculture while at the same time feeding an increasing world population, to ensure global food security.

Another source of innovation is new crops. Many of these come from overseas but there is increasing interest in the use of Australian native food plants as used by Aboriginal cultures. Australian plants are already adapted to Australia’s harsh conditions, so it may seem relatively easy to “domesticate” them. However it’s not that easy to find a single plant that produces fruit with all the desired characteristics and high yielding. Many of our everyday fruits have gone through 1000 or even 10,000 generations of selection since they were adopted as major food crops by local peoples, and now more intensively by plant breeders.

Explore some of the Australian native food plants currently being grown locally and explore the science required to develop a new plant-based industry. Take part in a sensory science exercise and analyse the data to learn how plant breeders and food manufacturers select the best plants and new products.

You will also investigate food preservation techniques and understand a common basis of many preservation techniques. Techniques such as drying have been used by Aboriginal peoples to produce fruit leathers for example that could be traded.

Food Manufacturing and Agriculture are major industries in Australia and rely heavily on staff with Science, Technology, Engineering and Maths (STEM) skills. Learn more about the exciting careers in Food, Nutrition and Agricultural Sciences to find a rewarding career. There will always be jobs as long as people need to eat!

Task E3. Use and preservation of muttonbirds by Aboriginal people

<table>
<thead>
<tr>
<th>Discover</th>
<th>Investigate the history of muttonbird usage in Aboriginal culture and how they are still used today.</th>
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</thead>
<tbody>
<tr>
<td>Understand</td>
<td>Explore the methods used to preserve muttonbird meat and fats.</td>
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</table>

Students will compare current methods of food preservation to those used traditionally by Aboriginal peoples.

Task E1. Sustainability of the food supply chain

<table>
<thead>
<tr>
<th>Discover</th>
<th>Australian native food plants</th>
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<tbody>
<tr>
<td>Understand</td>
<td>Factors affecting food security and the opportunities for new crops</td>
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Task E2. Muntries, an indigenous food plant from South Australia

<table>
<thead>
<tr>
<th>Discover</th>
<th>Flavours of manthari (muntjeberry) berries and products</th>
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<tbody>
<tr>
<td>Understand</td>
<td>The role of sensory science for food product development</td>
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Task E4. Food and Careers

<table>
<thead>
<tr>
<th>Discover</th>
<th>Science careers in food and agricultural industries</th>
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<tbody>
<tr>
<td>Understand</td>
<td>Personal skills that many employers value</td>
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Team work and long term planning

Many of you will spend more than 50% of your life working. Therefore its desirable to have employment that meets your needs and supports you, and for many of you, a family. Careers in food science and agriculture are not familiar to many students but are often exciting and varied with opportunity for career progression into management (and therefore higher salaries).

Watch two videos:

- Food Scientist career video: [http://www.youtube.com/watch?v=3rCgE8QBb5s] Highlights the varied role and range of activities involved in a single positive...
- Agriculture Industry careers video: [https://www.youtube.com/watch?v=3rCgE8QBb5s] Highlights the diverse roles available in agriculture and the large number of jobs offered by graduates.

Theme E: For teachers

<table>
<thead>
<tr>
<th>Task</th>
<th>Overview of Theme E - Australian Native Foods: Feeding Australia Sustainably</th>
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<tbody>
<tr>
<td>Title</td>
<td>Sustainability of the food supply chain</td>
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<table>
<thead>
<tr>
<th>Activity</th>
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<tr>
<th>Task/Skills</th>
<th>Describe</th>
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<thead>
<tr>
<th>Content Descriptions</th>
<th>Science as a human endeavor &amp; Science Inquiry Skills</th>
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<td>General Capabilities</td>
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Cross-curricular attributes: Inquiry project, Project
Overview

The science teaching resources are designed for both Aboriginal and non-Aboriginal students, and aim to

1. Help close the parity gap by encouraging more Aboriginal students to complete secondary school by developing engaging, culturally relevant science lessons;

2. Raise awareness, in all students, of Aboriginal cultures and traditional knowledge with a focus on people, cultures and ecology.

The learning materials focus on culture and ecology of the Ngarrindjeri lands in South Australia. There are references to Ngarrindjeri people and plants as well as some references to Kaurna plants and uses of materials from the Adelaide Plains.

We hope that these resources provide a framework for adapting this resource to other Indigenous cultures.

Weaving Ngarrindjeri History
- for students and teachers

Student Activity Book

History 1. Ngarrindjeri Kaldowinyeri
- Activity 1. Ngarrindjeri Kaldowinyeri
- Activity 2. Perspectives on Kaldowinyeri
- Activity 3. World Views
- Activity 4. Language related to Ngarrindjeri Kaldowinyeri

History 2. All things are Connected
- Activity 1. Cultural Meanings of Latun - Weaving
- Activity 2. Exploring the meaning of the terms 'Aunty' and 'Elder'
- Activity 3. The circle to Aboriginal people in the context of weaving and life
- Activity 4. Evaluating and applying learning
- Activity 5. Creating a story, film, photos or woven object
- Activity 6. Ngarrindjeri language related to weaving

History 3. The Stolen Generations
- Activity 1. Why me? - Individual stories
- Activity 2. The Assimilation & Integration Policies – effects on families
- Activity 4. The Assimilation & Integration Policies – attitudes/assumptions
- Activity 5. Effects of the Acts on Aboriginal individuals, families and communities
- Activity 6. The acts as they were applied in South Australia
- Activity 7. Sorry Day

History 4. Weaving: History and Gender
- Activity 1. Ngarrindjeri woven objects from different historical periods
- Activity 2. Contemporary Ngarrindjeri weaving
- Activity 3. Voice and audience of texts
- Activity 4. Value of historical information
- Activity 5. Debating
- Activity 6. Ngarrindjeri language related to woven items

History 5. Waterflows
- Activity 1. Words and meanings
- Activity 2. Contracting meanings
- Activity 3. Contracting views
- Activity 4. Changes to waterflows
- Activity 5. Ngarrindjeri language related to Sea and Country
- Activity 6. Proposal for a healthy river: Final project.

Access to Resources

https://www.dropbox.com/sh/dx76027rmwpcwd8/AABca-I5AQlxS-ZCMrGAh_MPa?dl=0
or https://www.adelaide.edu.au/directory/carolyn.schultz


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Acknowledgements

We are grateful to the Yitpi Foundation for encouragement and financial support for this project.

Yitpi is the Kaurna word for seed.

We dedicate this project to the late Professor Tony Rathjen, and past and present Aboriginal peoples in Australia whose way of life changed forever with the invasion of Australia by Europeans over 200 years ago.

Special thanks to Verna Koolmatrie, Kevin Kropinyeri, Derek Walker, Clyde Rigney and other members of Raukkan Community in the Coorong Ngarrindjeri Lands for collaborating on this project.

And to Aunty Ellen of Camp Coorong for teaching us to weave.