Cultural Burning – Example Teaching Sequence (Year 7)

Biological sciences

Students investigate how Aboriginal and/or Torres Strait Islander Peoples use fire to manage ecosystems, focusing on fire as an **abiotic factor** and its interaction with **biotic components**. Through this topic, students explore how cultural burning practices promote plant growth, maintain habitats, and support sustainable land management.

Students see firsthand how the fire, an **abiotic** factor is an important component of many Australian ecosystems, by investigating the influence of fire on plant germination. Students develop and exhibit a range of **working scientifically** skills, such as **observing, questioning and predicting, planning investigations, conducting investigations, processing data and information, analysing data and information**, and **communicating**. Students discover that Aboriginal and/or Torres Strait Islander Peoples used these same science skills thousands of years ago when they noticed **patterns and trends** in plant responses post-cultural burning. Furthermore, students see how this traditional understanding of the **abiotic** factor (fire) was utilised to manage and manipulate the landscape, and how these knowledges are being recognised and applied today.

Before you start:

1. All documents and resources are available via our website: Cultural Burning education resources.
2. Review the following teacher documents:
    - *Context PP (Cultural Burning)* and *Classroom Activities Guide (Cultural Burning*)
    - *Experiment PP (Cultural Burning)*, *Teacher Experiment Procedures (Cultural Burning)* and *Equipment list and Hazard Planner (Cultural Burning)*
    - *Curriculum Links (Cultural Burning)*
3. The classroom activities have been designed to chunk information and to provide opportunities to check understanding.
4. Familiarise yourself with the central investigation: How does fire affect seed germination rate of native species?
5. Review the example teaching sequence below and adjust based on the needs of your class. Sixty-minute lessons are assumed in this example.

Lesson	Lesson objectives	Resources	Australian curriculum
1	• Understand and recognise abiotic and biotic ecosystem factors. • Understand that living things have shared characteristics. • Understand Aboriginal and Torres Strait Islander fire knowledges.	• *Context PP (Cultural Burning)* • *Classroom Activities Guide: Connect to Country* and *Connect to Country Student Activity Sheet.* • *Classroom Activities Guide: Fire as a tool for ecosystem health* and *Student worksheet: Fire as a tool for ecosystem health.* • *Cultural Burning Video:* Cultural Burning on Wugularr Country	*SAC9S7U02* *AC9S7H02* *AC9S7H03*
2	• Understand that cultural burning comes from a place of deep understanding and scientific thinking. • Understand cultural burning as a contemporary scientific land management practice.	• *Context PP (Cultural Burning)* • *Cultural Burning Video:* Cultural Burning on Wugularr Country • *Classroom Activities Guide: Activity 3 - Cultural Burning Case Studies*	*AC9S7U02* *AC9S7H02* *AC9S7H03*

3	• Cultural burning experiment: Part A: Fire/heat/smoke treatment:
	• Identify the question: *How does fire affect seed germination rate of native species?*
	  ○ Make predictions to guide scientific investigation.
	• Identify independent, dependent and control variables.
	• Can use the concept of 'fair test' when explaining variables:
	  ○ Outline steps to identify safety risks.
	  ○ Follow a planned procedure to undertake safe and valid investigation.
		• *Experiment PP (Cultural Burning)*
		• *Equipment List and Hazard Management Guide (Cultural Burning)*
		• *Teacher Experiment Procedures FIRE and HEAT (Cultural Burning)*
		• *Student FIRE Experiment Procedure and Planner (Cultural Burning)*
		• *Student HEAT Experiment Procedure and Planner (Cultural Burning)*
			SAC9S7U02
			AC9S7H02
			AC9S7H03
			AC9S7I01
			AC9S7I02

4	• Cultural burning experiment: Part B: Seedling tray preparation and planting: ○ Outline steps to identify safety risks.	• As listed in Lesson 3.	*SAC9S7U02* *AC9S7I02* *AC9S7I04*

	• Follow a planned procedure to undertake safe and valid investigation.		*AC9S7I05*
2 – 4 week time frame to allow for germination			
5	• Cultural burning experiment: Part C: Collect, process and analyse data: ○ Process and represent data. ○ Use data to identify trends, patterns and relationships, and draw conclusions. ○ Communicates scientific concepts and ideas using a range of communication forms.	• As listed in Lesson 3.	*SAC9S7U02* *AC9S7H02* *AC9S7H03* *AC9S7I02* *AC9S7I06* *AC9S7I07* *AC9S7I08*

Lesson 1

Prior knowledge: Introduction to ecosystems at appropriate stage level

Learning intentions:

- Explore traditional use of fire by Aboriginal and Torres Strait Islander peoples to manage natural environments.
- Understand abiotic and biotic ecosystem factors.
- Identify effects of fire (abiotic factor) on ecosystems.

Success criteria:

- Can discuss traditional and contemporary Aboriginal and Torres Strait Islander Peoples' use of fire.
- Can sort ecosystem factors into biotic and abiotic categories.
- Can list effects of fire on biotic and abiotic ecosystem factors.

Resources: See example teaching sequence above on page 2.

Classroom Activities

1. Recap ecosystems.
2. Share Learning Intentions and Success Criteria.
3. Show what you know:
    a. What have you seen, heard or learnt about fire in the natural world?
    b. Is fire always a destructive force?
    c. Is fire alive?
4. View video: Cultural Burning on Wugularr Country
    a. When do they conduct their burns? Why this time of year?
    b. What happens if they burn too late/towards the end of the year?
    c. What are some things the rangers and Elders look for before they do a burn?
5. Discussion and note taking: Cultural Burning Context PowerPoint slides 4 – 10
6. Knowledge Check: Cultural Burning Context PowerPoint slides 11 – 12
7. Discuss what are abiotic and biotic factors: Context PowerPoint slide 13
8. Discuss the influence of fire on abiotic and biotic factors: Context PowerPoint slide 14-15
9. Knowledge Check: Cultural Burning Context PowerPoint slides 16
10. Connect to Country – Exploring abiotic and biotic ecosystem factors Cultural Burning Context PowerPoint slide 17
    a. Walk to an outdoor space on site with elements of an ecosystem (eg. native garden, garden beds, creek, nature reserve).
    b. Record the living and nonliving features of the system onto Biotic/Abiotic printout.
    c. Sort the ecosystem features you see into biotic/abiotic categories (Sorting cards, brainstorming boards etc).
11. CSIRO Case Study Cultural Burning Context PowerPoint slides 18 - 19
12. End of lesson knowledge check: Cultural Burning Context PowerPoint slide 17
    a. Identify one biotic and one abiotic ecosystem factor from the image.

b. Fire is a biotic/an abiotic ecosystem factor (write correct response on a whiteboard).
c. Give an example of how Cultural Burning can affect and ecosystem.
d. Give an example of a way fire can be used to improve the health of an ecosystem.

Next Lesson – CSIRO Case Studies.

Lesson 2

Prior knowledge: Introduction to ecosystems at appropriate stage level, introduction to Cultural Burning.

Learning intentions:

- Understand that Cultural Burning comes from a place of deep understanding and scientific thinking.
- Understand that Cultural Burning is a contemporary science.

Success criteria:

- Can give an example of Cultural Burning as a contemporary ecological tool.
- Explains how observations of cultural burns are used by Traditional Owners and scientists to increase knowledge and understanding of ecosystems.

Resources: See example teaching sequence above on page 2.

Classroom Activities

1. Recap ecosystems and Cultural Burning.
2. Share Learning Intentions and Success Criteria.
3. Show what you know:

   Classroom activity guide (pages 10 -14): Cultural Burning research jigsaw.

   a. Divide students into groups of 4.

   b. Assign one case study to each student.

   c. Give students their case study and notes print out time to read it at least twice and become familiar with it.

   d. Form temporary "expert groups" - each expert joins other students assigned to the same case study. They will:

      i. discuss the main points of their segment and

      ii. prepare their notes to take to their jigsaw group.

   e. Bring the students back into their jigsaw groups.

   f. Each student presents their segment to the group.

   g. Reflection:

   h. What is the purpose of Cultural Burning in these case studies?

   i. Why is Cultural Burning different from bushfires?

   j. What does the case studies tell us about the importance of Indigenous knowledge?

   k. How is cultural knowledge a vital part of Australian conservation?

   l. Were there any ideas or concepts you hadn't considered before?

Next Lesson – Cultural Burning Experiment/s.

Lesson 3 and 4

Prior knowledge: Introduction to ecosystems at appropriate stage level, introduction to Cultural Burning.

Learning intentions:

- Revisit abiotic and biotic factors of an ecosystem.
- Connect investigation with Aboriginal and/or Torres Strait Islander People's fire practices.
- Explain the impact of fire on native seed germination rate.

Success criteria:

- Can generate a hypothesis.
- Can safely conduct an experiment

Resources: See example teaching sequence above on page 2.

Safety

- This investigation involves fire and/or the use of boiling water and potting media.
- Check local fire safety ratings.
- Use appropriate PPE (heat proof gloves, goggles, lab coats)
- Have fire bucket, fire extinguisher and/or fire blanket ready.

Timeline

- Set up and conduct: 2 lessons
- Germination: 2 – 4 weeks
- Analyse results: 1 – 2 lessons

Classroom Activities

1. Review: ecosystems, abiotic and biotic factors, Cultural Burning practices and purposes.
2. Share Learning Intentions and Success Criteria.
3. Introduce Investigation: *How does fire affect seed germination rate of native species?*

   Discuss *Acacia aneura, Senna artemisoides* plants:

   a. Why might these be the seeds we're testing?

   b. What are the benefits of promoting these plants?
4. Develop experiment question and hypothesis:

   a. How do you think fire (heat) will affect germination? Why?

   b. How do you think it will affect the number of seeds that will germinate?

   c. Do you think it will affect the time it takes seeds to germinate? How?
5. Hand out Student *FIRE Experiment Procedure and Planner (Cultural Burning):* record investigation question and hypothesis.
6. Ask the students to suggest how they will determine germination numbers and rates

and discuss how valid these measurements would be. These could include:

   a. Recording the total number of seeds that germinated and those that didn't.
   b. How many seeds germinated each day within a given period to determine rate.

7. Define dependent, independent and control variables:
   a. What will your group change?
   b. What will your group measure?
   c. What data is going to be collected?
   d. How is the data going to be recorded?
   e. What will your group control or keep the same to ensure a fair test?
8. Discuss and record safety considerations.
9. Conduct investigation:
   a. Lesson 3: Fire/heat/smoke treatment.
   b. Lesson 4: prepare seedling tray and plant seeds.
   c. Observe seedling trays over two weeks.

Next Lesson – Cultural Burning experiment – analyse results and reflect.

Lesson 5

Prior knowledge: Have completed the Cultural Burn experiment/s and observed germination rate over 2 - 4 weeks (depending on germination times).

Learning intentions:

- Connect investigation with Aboriginal and Torres Strait Islander People's fire practices.
- Explain the impact of fire on native seed germination.

Success criteria:

- Can process and represent data.
- Can use collected data to identify trends, patterns and relationships, and draw conclusions.
- Can communicate scientific concepts and ideas, highlighting links between Aboriginal and Torres Strait Islander knowledges and western scientific concepts.

Resources: See example teaching sequence above on page 2.

Classroom Activities

1. Collect final data.
2. Facilitate data representation discussion:
    a. What data was collected during observations of the experiment?
    b. How can the data and observations collected during the experiment be represented effectively?
3. Allow time for groups to decide on an effective way to represent data and record onto their *Student FIRE Experiment Procedure and Planner (Cultural Burning):*
    a. What patterns did your group identify from the data?
    b. What effect did fire (heat) have on the germination of seeds?
4. Conclusion:
    a. Do the results support your hypothesis? Why/why not?
    b. How did different group's observations compare to yours?
5. Explain to students that reflection is an important aspect of the experiment process to identify areas of the investigation that need to be changed to improve the investigation. These could include possible changes to the method, equipment list or data gathering techniques:
    a. What worked well during the investigation? Why?
    b. What challenges did your group encounter during the investigation?
    c. Was it a fair test? Why?
    d. What could you change to improve the investigation?
6. Link back to Aboriginal and Torres Strait Islander context:
    a. What does this investigation highlight about Aboriginal and Torres Strait Islander Peoples' understanding of biodiversity and ecosystems?

b. How is this knowledge applied?

c. How could knowledge of seed germination and cultural burning be used to manipulate ecosystems?

d. What benefits would this have for communities?

Take it Further – Consider Classroom Activities for suggestions.