



Investigate and Innovate with CSIRO

Indigenous Research Methodology (IRM) - Water

Year level: Years 5-6, 7-8

Duration: Teacher specified

Core concepts: Water in our environment, groundwater and Indigenous knowledge of water systems

Teacher guide



Acknowledgement of Country

CSIRO acknowledges the Traditional Owners of the lands, seas and waters of the area that we live and work on across Australia. We acknowledge all Aboriginal and Torres Strait Islander peoples and their continuing connection to their culture and pay our respects to Elders past and present. CSIRO is committed to reconciliation and recognises that Aboriginal and Torres Strait Islander peoples have made contributions to all aspects of Australian life including culture, economy and science.



**'Eternal Wisdom,
Infinite Innovation'**
artwork by Rachael Sarra, working with
Gilimbaa.

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Overview

Safety considerations:

- It is recommended to hold a class discussion regarding the possible risks and mitigation strategies prior to starting the activity.
- Slippery surfaces and weather exposure.
- Wear weather appropriate clothing and sun protection.

Pre-learning:

We recommend completing [CSIRO's Cultural Considerations](#) E-Learning modules prior to commencing exploration of this topic.

Key learning goals:

Slide 4 in IRM Water Classroom PowerPoint Presentation.

CSIRO research:

- CSIRO website - [Indigenous Research Methodology for drought resilience](#)
- CSIRO website - [Sharing knowledge of drought resilience on Country](#)
- CSIRO - [Cultural indicators for drought resilience](#)

Associated documents: [Investigate and Innovate with CSIRO webpage](#)

- Water in the environment and Groundwater - Student Workbook
- Water in the environment and Groundwater - Classroom PowerPoint Presentation (PPT)
- Australian Curriculum and Syllabus links and rubrics.






Icons:

Throughout the investigation you will see these icons (below) to highlight the type of activity and guidance recommended.



What is the Indigenous Research Methodology (IRM)?

The Indigenous Research Methodology (IRM) (Moggridge, Thompson, & Radoll, 2022) is a framework for learning science through Aboriginal and Torres Strait Islander Peoples' deep knowledge of Country. It connects Indigenous and western scientific approaches through shared practices like observing, predicting and testing. Used in the classroom, IRM helps students engage with scientific inquiry while meeting Science curriculum outcomes and the Aboriginal and Torres Strait Islander Histories and Cultures priority.

IRM Stage	Image	Explanation
1. Connecting with Country		Elements of Country, including the Great Emu in the Sky constellation, rainfall and a flowing river, represent the first stage. Indigenous Peoples have been observing Country since time immemorial. They comprehensively understand all elements of Country including Land, Water and Sky Country. For example, if a river flow changes, Indigenous Peoples can foresee the flow on effects to other parts of Country.
2. On-Country learning		The symbol of places on Country connected by waterways represents the second stage. Indigenous Peoples learn about Country by walking, seeing, smelling, hearing and feeling Country. Country is constantly changing and therefore Indigenous Knowledge is always flowing and evolving. For example, senior Indigenous Peoples may walk Country to monitor wind behaviour, temperature and soil moisture levels before conducting a cultural burn.
3. Recording knowledge		Sandstone engravings of culturally significant animals symbolise the third stage. Indigenous Peoples have recorded and preserved data and knowledge for thousands of years. They store knowledge in Dreaming stories, rock art, technology, ceremonies, songs, dances and Songlines. Kinship systems including human and non-human relations, age and gender, guide how knowledge is held, communicated and passed on.
4. Toolmaking and resources		Cultural objects, including a boomerang, grinding stone, fishhook and spearhead, represent the fourth stage. Preserving, sharing and passing on knowledge of Country has allowed Indigenous Peoples to continually create new tools and resources to manage their Country, live sustainably and adapt to environmental change. For example, fish traps are another helpful tool that Indigenous people continue to preserve and modify to source food more efficiently and sustainably.
5. Reflection and evaluation		The symbol of people gathering and fishing along a river represents the fifth stage. When new tools or practises are implemented to respond to Country, Indigenous Peoples to have always monitored, evaluated and managed their impacts on Country and their communities. For example, the return of cultural species after a cultural burn or flood may indicate healthy Country.

Background information: Indigenous Research Methodology (IRM)

“Our Culture is old. It’s ancient. It is the essence of this country, connects us all to living things such as place, flora and fauna, our waterways and skies, our ceremonies and lores, it’s part of who we are as Murri people. Our rivers flowing and filtering on through to our lakes are the bloodline and life forms that run through our country, this creates the holistic importance of connection of all living things for survival.”

- Rhonda Ashby, Narran Lake Nature Reserve Aboriginal Joint-Management Committee member (Yuwaalaraay and Gamilaraay, 2017) cited in (Coleman, McKemey, & Coleman, 2017)

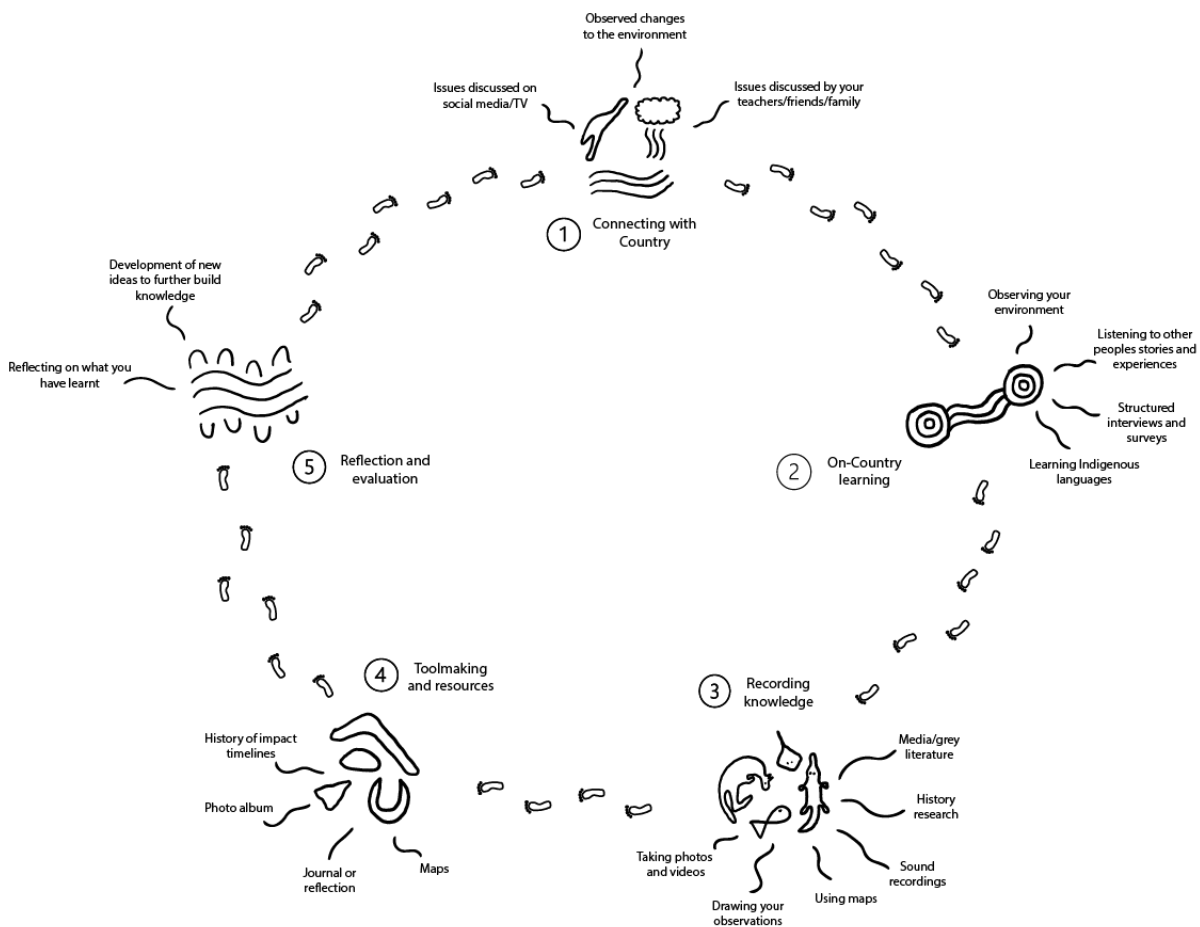


Figure 1 Indigenous Research Methodology diagram

CSIRO researchers and Indigenous Scholars are looking at how to decrease the effects of drought in Australia as they become more frequent and more severe. A key part of this research project is

recognising Aboriginal and Torres Strait Islander (Indigenous) People's deep understanding of Country to collaboratively collect and share Indigenous knowledges in a way that both respects Indigenous Cultural Intellectual Property and is recognised by the western scientific community. CSIRO researchers and a Kamilaroi Scholar have worked closely with the Narran Lakes Joint Management Committee to apply an Indigenous Research Methodology (IRM) that captures their understanding of drought resilience.

The IRM is based on (Moggridge, Thompson, & Radoll, 2022). In this activity, it will scaffold an investigation exploring how water moves on Country, embedded in Indigenous ways of knowing, being and doing. Students will consider their perspectives and positionality with reference to science, and conduct an investigation based around Indigenous Australian's deep connection to and understanding of Country.

“Country encompasses land, waterways, seas and skies, as well as the energy and space in between. It also encompasses relationships. **Relationships with plants, relationships with animals and relationships with Ancestors** (to name a few).” (Pol, 2023)

Aboriginal and Torres Strait Islander People's cultures are diverse, with more than 250 language groups, however, one commonality is connection to Country, seeing people as part of Country and enduring cultural practices of observing and understanding Country.

“Indigenous Peoples have been observing Country since time immemorial. They comprehensively understand all elements of Country, including Land, Water and Sky Country.” (Fabila, et al., 2025)

Take a moment to consider your own connection to and perspective of Country, and how your culture has influenced how you see the world around you.

“We don't own the land, we all belong to the land, it is part of us as much of us being part of it. In a family setting, it's like mother with her child, she will nurture its growth by being responsible for providing the care and this will continue on generation after generation. It's a cycle of respect, look after one another, look after our trees and waterways, our animals, we all have a place in this, we all have a responsibility with our mother, as she will always look after us and in return, we look after our mother. Take what you need, not what you want, as greed is a form of selfishness, you take, you give back, it's that simple!”

- Rhonda Ashby, Narran Lake Nature Reserve Aboriginal Joint-Management Committee member (Yuwaalaraay and Gamilaraay, 2017) cited in (Coleman, McKemey, & Coleman, 2017)



Word bank and pronunciation guide

Language and pronunciation notice

Aboriginal and Torres Strait Islander languages are living, place-based languages. Words, spellings and pronunciations can vary between Countries, Nations and communities.

The pronunciations provided in this resource are approximate only and are intended as a guide. For accurate local pronunciation and deeper understanding, educators and students are encouraged to engage with local Aboriginal and Torres Strait Islander communities, Elders or language custodians.

Schools are encouraged to identify the local Aboriginal Nation and language of the Country they are on (e.g. using the AIATSIS Map of Indigenous Australia) and, where appropriate, replace or add local language terms with guidance from local Aboriginal Land Councils, community organisations or Elders.

Word	Pronunciation	Meaning	Local replacement (insert local Nation / language term)
Ancestors		Spiritual beings, creation figures and Elders past and present who remain connected to Country.	
Baayami	BY-uh-mee (often said BY-ar-mee)	An Ancestor being in many north-eastern Aboriginal cultures; appears in the Narran Lakes creation story.	
Caring for Country		Indigenous stewardship practices focused on responsibility, reciprocity and long-term care for land, water and living things.	
Country		Country is a holistic concept encompassing land, waters, seas and skies, which inform and are reflected in laws, culture, language, spirituality, family, identity, and ways of living passed down over generations. Country refers to a specific, defined region,	

		rather than Australia as a whole nation. <i>Teacher note: Country is understood as a living entity and is written with a capital 'C' when used in this context.</i>	
Dharriwaa	DAH-ree-wah	Yuwaalaraay name for Narran Lakes, an important cultural and ecological place.	
Dreaming (Dreaming stories)		Stories, knowledges and law that explain creation, relationships, responsibilities and connections to Country.	
Gali	GAH-lee	Yuwaalaraay word for water.	
Gali Gurunha	GAH-lee goo-ROON-hah	Yuwaalaraay term meaning “water in those holes”, referring to groundwater and springs in the landscape.	
Gamilaraay (Gamilaraay/Kamilaroi/Gomeroi)	gah-MIL-uh-rye	An Aboriginal language group and People from north-central NSW and southern Queensland.	
Garriya	GAH-ree-yah	A serpent or crocodile being in Yuwaalaraay stories who moves water through the landscape.	
Gilgaays	GILL-gays	Small, shallow waterholes that hold water in the landscape.	
Guru	GOO-roo	Yuwaalaraay word for hole.	
Indigenous Research Methodology (IRM)		A research approach grounded in Indigenous ways of knowing, being and doing, emphasising relationships, story, reciprocity and respect for Country.	
Kamilaroi	KAM-uh-luh-roy	Common alternate spelling of Gamilaraay / Gamilaraay.	
Murri	MUR-ee (like “Murray”)	A term many Aboriginal peoples from Queensland and parts of northern NSW use to describe themselves.	
Namoi	NAH-moi	Name of the Namoi River in NSW, important to several Aboriginal Nations.	
Narran	NAH-ran	Name of the Narran River and Narran Lakes area in NSW; a	

		key part of the Murray–Darling Basin.	
On Country		Learning, observing and engaging directly on the land, recognising Country as a teacher.	
Positionality		Awareness of one’s own background, culture and perspective when engaging with Indigenous knowledge and Country.	
Songline		Pathways across Country that record stories, law, navigation and knowledge, often linked to water, landforms and Ancestors.	
Walgett	WOL-get	Town in north-western NSW; the name comes from local Aboriginal languages.	
Yarning		A culturally appropriate way of sharing knowledge through storytelling, discussion and listening.	
Yuwaalaraay (Euahlayi, Uallaroi)	yoo-WAH-luh-rye	An Aboriginal language group and People from north-western NSW.	



Background information: water in our environment

The way water moves in our environment influences the shape of the environment, what life it can support and how severely the environment is impacted by major events, such as flood and drought.

In this investigation, you will use the Indigenous Research Methodology (IRM) (based on Moggridge, Thompson, & Radoll, 2022) to implement an Indigenous way of knowing, being and doing, while you investigate the movement of water in your local environment. You can take time to observe, understand and be part of the Country you are on, by paying attention to the way water moves.

The Yuwaalaraay People understand the movement of water through the local Narran Lakes system. They have built this understanding through stories and memories, passed down through thousands of years spent observing Country. They can predict with high levels of accuracy where water will flow and the impact it will have on Country.

One example of how long-term knowledge of water movement on Country is stored in stories, songlines and through oral memory keeping is the Yuwaalaraay Dreaming Story describing the creation of Dharriwaa (Yuwaalaraay Traditional Knowledge, Narran Lake Aboriginal Joint Management Committee, 2017).

The Narran Lakes are an ephemeral lakes system that dries out between flooding events. It is part of the greater Darling catchment and a key element of the Murray- Darling Basin. The flow of water through this system commences with heavy rainfall events in Queensland, which feed the catchments for the Murray and Darling River systems, including the Narran Lakes.

The Narran Lakes system and surrounding flood plains only receive significant water when there are very large flood events, usually caused by tropical storms. When the water does come, it initiates huge increases in plant and animal life.



Figure 2 Lush lignum flourishing when Back Lake is full, Jan 2025. Lignum is an essential nesting.



Figure 3 The same area of Back Lake, September 2024. The ibis will not come to nest where there is no lignum.

The Dreaming story of the creation of the Narran Lake depicts the flooding and drying events that occur in the Lakes system and demonstrates the Yuwaalaraay People's deep understanding of the water movement on Country. This Dreaming Story can be dated back to at least 30 000 years ago and connected to fossilised crocodile remains found in the area.

Classroom PowerPoint (PPT) presentation guide – Water in our Environment

Consult the equipment lists (Investigation: Water in the environment - Page #11) provided in each investigation and adjust resource quantities according to student or group numbers.

Indigenous Research Methodology (IRM)	Slide # Classroom PowerPoint Presentation (PPT) Page # (Student Workbook)	Activity
	Slide 2 Pages 3-4	Teacher reference slide - IRM. Student reference page –IRM and icon explanation.
	Slide 3-4	The Indigenous Research Methodology (IRM) – We encourage educators to watch the IRM explanation video prior to exploring the investigation. <i>Optional: Share the video with your students</i>
1. Connecting with Country	Slides 5-9 Pages 6-8	<p>Note: questions and talking points for each section can be found in the presenter notes</p> <p>Connecting on Country – explanation of the first stage of the IRM (Slide 5). Ask: What place in nature makes you feel connected or calm? (Slide 6)</p> <p>Introduce students to the deep, spiritual connection Aboriginal and Torres Strait Islander Peoples have with Country, and to reflect on their own sense of place.</p> <p>Acknowledgement of Country – find out the Traditional Owner and language groups of the Country you are living and learning on via Map of Indigenous Australia (Slide 7)</p>

Slide 10-14
Pages 9-10

Class Discussion – What does ‘Country’ mean to Aboriginal and Torres Strait Islander Peoples?

Record key words, e.g. land, water, sky, spirit, family, language, care, belonging. See *Appendix A* for activity ideas and links

Discuss Dreaming Stories students have heard/know of – consider what they tell us about Country.

Read the Dreaming Story of Narran Lakes (*Appendix A*), or watch it being told on Country (Slide 9 – **Note:** questions and talking points can be found in the presenter notes):

Part 2 – Dharriwaa Living with Climate Change. (Dreaming Story: 3:00 – 5:00)

<https://www.youtube.com/watch?v=F2zDk3Tv36Q>

On-Country Learning – explanation of the second stage of the IRM.

Think-pair-share: - How much do you know about water in your environment? Have you seen and understood where water goes and how it shapes your school?

Students may respond with, knowledge about the water cycle, rain events, flooding, etc.

How does water move through and shape the school grounds?

Compare and Contrast – The Narran Lakes (Images) – Slide 11 (Discussion can be found in the presenter notes).

Commence investigation #1

Students will learn ‘On Country’ by investigating how water moves through and shapes their school grounds (Slide 12).

Students will model or observe rainfall and map the flow of water ‘On Country’ (school grounds) using watering cans and observe water flow in different locations and on different surfaces.

Begin discussions of the investigation by viewing the images on Slide 13 (Discussion question can be found in the presenter notes).

Slide 14, Page 9 – Begin planning the investigation by identifying the variables and writing a prediction.

Page 10 – Sketch the prediction

<p>3. Knowledge Recording</p>	<p>Slide 15-18 Page 11-13</p>	<p>Investigation continued: Side 15 -18, Pages 11-13 –instructions can be found in the student workbook and on the respective slides in the classroom PPT. Students can collect knowledge by:</p> <ul style="list-style-type: none"> • collecting data in a table, and • recording observations on a site map.
<p>4. Tool making and resources</p>	<p>Optional activity – teacher led. Page 14</p>	<p>Students create an integrated site map that includes data from their on-Country learning showing water movement on Country.</p>
<p>5. Reflection and evaluation</p>	<p>Slide 20 Pages 15-17</p>	<p>Students reflect on their investigation and make recommendations on how water could be better managed on site. They recommend changes or next steps.</p> <ul style="list-style-type: none"> • Where did you see water going in the school grounds? • Where would you expect to see water shaping the school grounds? <p>Glossary (Slide 29, Page 50) – teacher to determine whether students populate the glossary independently or through explicit instruction.</p>

Additional resources

Indigenous Research Methodology (IRM)	Slide # Classroom PowerPoint Presentation (PPT) Page # (Student Workbook)	Activity
	Page 42-52	For students engaging in an independent science investigation for Water in our Environment and Ground water, provide the 'Science Investigation Planner' pages to guide them through their independent investigation.
Optional Supplemental Resources	Pages 31-36	Process diary – optional
	Pages 37-38	Presentation plan and notes – Optional
	Page 39-40	Investigation reflection – Optional
	Page 41	Take it further – Optional extension activities
	Pages 54-58	Page 54 – Notes Pages 55-56 – Research Journal Page 57 – Graph paper (5mm) Page 58 – Graph paper (10mm)

Supplemental teacher resources

- [Central Western Plains: Narran Lake creation story | Gather](#)
- [Bedtime Stories | Common Ground](#)
- [What Is Country? | Common Ground](#)

Videos - Dharriwaa Living with Climate Change videos

- [Part 1 - Dharriwaa Living with Climate Change](#)
- [Part 2 - Dharriwaa Living with Climate Change](#)
- [Part 3 - Dharriwaa Living with Climate Change](#)

Professional development

- [8 Aboriginal Ways of Learning](#)
- [Narragunnawali - Caring for Country](#)
- [Professional Development for Educators | Ngarrngga | Ngarrngga](#)
- [Narragunnawali - A Matter of Perspective](#)

Risk assessment

A risk assessment has been provided for this activity. However, it is recommended to hold a class discussion regarding the possible risks and mitigation strategies prior to starting the activity. Appropriate PPE should be worn during this activity. **Caution** students should be supervised while collecting data outside.

Activity	Inherent Risk	Elimination or control measures
Collecting data outside	Weather exposure	Take appropriate precautions according to weather conditions, e.g. raincoat, hat, sun lotion, minimal skin exposure.
	Slips, falls, abrasions, insect bites	While outside, students are advised of possible risks- slipping on wet ground, trips and falls etc., advise all students to observe insects, arachnids and other animals but not to touch. Adults supervise students during data collection.
Collecting data in wet weather	Slips, hypothermia	Wear weather appropriate clothing, e.g. raincoats and covered shoes, and have spare dry clothing.



Background information – Groundwater

Aboriginal and Torres Strait Islander People's deep knowledge of groundwater and ecosystem resilience complements the western scientific research currently being undertaken by CSIRO to improve Australia's resilience to drought.

Keeping water on Country, hydrating the earth and recharging the water table are essential elements of ecosystem resilience to extreme weather events. The Great Artesian basin, which spans 1.7 million square kilometres across the Northern Territory, Queensland, New South Wales and South Australia is one of the world's largest underground water sources. Water emerges through cracks to create spring, creeks and rivers and it maintains permanent water sources.

The Yuwaalaraay People of Dharriwaa (Narran Lakes) have a deep understanding of the Gali Gurunha, the underground water sources and springs that make up part of the Great Artesian Basin and we can hear that knowledge in Dreaming Stories (see Appendix A). Today, we know that in this part of the world the Great Artesian Basin ranges from 500 to 1000 metres below the surface and bores have been drilled to access the ancient water source. Yet through Yuwaalaraay Dreaming, it was Garriya the crocodile who took water underground from the surface and brought it up again to create springs and soaks (Yuwaalaraay Traditional Knowledge, Narran Lake Aboriginal Joint Management Committee, 2017).

The Yuwaalaraay people's understandings of Country are helping inform CSIRO's Drought Resilience Research, and they have been instrumental in the application of an Indigenous Research Methodology (IRM). This methodology is grounded in deep reciprocal relationships, honour Aboriginal and Torres Strait Islander Peoples' extensive knowledge of Country, recognise that scientific knowledge can be stored in numerous ways, including stories and memories and can be shared through yarning, storytelling and observing Country.



Figure 4 Coocoron Lake, a field of native grasses, February 2024.



Figure 5 Coocoron Lake, bare and dry, May 2025.

In this inquiry, you will use the Indigenous Research Methodology (IRM) based on (Moggridge, Thompson, & Radoll, 2022) to investigate how plant life impacts the way water is held on Country and consider the value and importance of an ecosystem rich in plant life not only for economic gain, but as a food source for people and animals, home for insects and amphibians and their vital role in mitigating the effects of drought by slowing the flow of water and keeping water on Country.



Classroom PPT presentation guide – Groundwater

Consult the equipment lists (Investigation: Groundwater- Page #24) provided in each investigation and adjust resource quantities according to student or group numbers.

Indigenous Research Methodology (IRM)	Slide # Classroom PowerPoint Presentation (PPT) Page # (Student Workbook)	Activity
	Slide 2 Page 4	Teacher reference slide - IRM. Student reference page –IRM and icon explanation.
	Slide 3	The Indigenous Research Methodology (IRM) – We encourage educators to watch the IRM explanation video prior to exploring the investigation. <i>Optional: Share the video with your students.</i>
1. Connecting with Country	Slides 5 -9 Page 19	<p>Note: questions and talking points for each section can be found in the presenter notes</p> <p>Connecting on Country – explanation of the first stage of the IRM (Slide 5).</p> <p>Ask: What place in nature makes you feel connected or calm? (Slide 6)</p> <p>Introduce students to the deep, spiritual connection Aboriginal and Torres Strait Islander Peoples have with Country, and to reflect on their own sense of place.</p> <p>Acknowledgement of Country – find out the Traditional Owner and language groups of the Country you are living and learning on via Map of Indigenous Australia (Slide 7)</p> <p>Class Discussion – What does ‘Country’ mean to Aboriginal and Torres Strait Islander Peoples?</p> <p>Record key words, e.g. land, water, sky, spirit, family, language, care, belonging. See Appendix A for activity ideas and links</p> <p>Discuss Dreaming Stories students have heard/know of – consider what they tell us about Country.</p>

Slides 22-23
Pages 19-20

Read the Dreaming Story of Narran Lakes (Appendix A), or watch it being told on Country (Slide 9 – Note: questions and talking points can be found in the presenter notes):

Part 2 – Dharriwaa Living with Climate Change.

(Dreaming Story: 3:00 – 5:00)

<https://www.youtube.com/watch?v=F2zDk3Tv36Q>

See Appendix A for activity ideas and links.

What can the story tell us about the groundwater at Dharriwaa (Narran Lakes)?

Direct conversation to the Country you are on:

- Share stories of major storm/drought events where water has shaped or changed the land.
- What do you know about groundwater?
- What do you know about bores, wells or springs?
- Discuss groundwater as seen in media.

Investigation #2 Groundwater – Slide 21 (See presenter notes for key points)

Think-Pair-Share (Slide 22) –

Compare the two Coocoran Lake images and answer the question on the slide.- Discuss how plant life impacts the way water is held on Country and consider the value and importance of an ecosystem rich in plant life that includes plant’s role in mitigating the effects of drought by slowing the flow of water and keeping water on Country (See presenter notes for key points).

Commence Investigation #2 – Slide 23

In this activity, students will test how plant life influences the way water moves through or is held in the environment.

Students will investigate comparing the way water erodes and runs off soil or seeps into groundwater stores in samples that are bare, covered with leaf litter/pebbles and planted (e.g. grass).

Slide 23, Page 19 – Begin planning the investigation by identifying the variables and writing a prediction.

Page 20 – Sketch the prediction

<p>3. Knowledge Recording</p>	<p>Slide 24-26 Pages 21-27</p>	<p>Investigation continued: Slides 24-26, Pages 21-27 –Instructions can be found in the student workbook and on the respective slides in the classroom PPT.</p> <p>Students collect knowledge in the forms of taking notes, collecting data in a table, taking photographs, video or sketches, learning Indigenous Languages.</p>
<p>4. Tool making and resources</p>	<p>Slide 27 Pages 34-35</p>	<p>Students can create a presentation about their experiment – either about ‘Water in the Environment’ and/or ‘Groundwater’ or both.</p>
<p>5. Reflection and evaluation</p>	<p>Slide 28 Page 36-37</p>	<p>Students reflect on their inquiry and make recommendations on how water can be slowed down and encouraged into groundwater stores. They recommend changes or next steps.</p> <ul style="list-style-type: none"> • How did the ground cover change the way the water moved through the soil samples? • How can knowing how water works with soil and plants help us understand and manage Country? • What other values do plants bring to an ecosystem? <p>Glossary (Slide 29, Page 50) – teacher to determine whether students populate the glossary independently or through explicit instruction.</p>

Risk assessment

A risk assessment has been provided for this activity; however, it is recommended to hold a class discussion regarding the possible risks and mitigation strategies prior to starting the activity. Appropriate PPE should be worn during this activity – gloves, safety glasses, lab coats.

Activity	Inherent Risk	Elimination or control measures
Exposure to potting media	Infection or illness	<ul style="list-style-type: none"> • Moisten potting media before use to minimise dust. • Wear gloves and mask while handling potting media. • Wash hands after handling potting media. • Use lower risk media as suggested – propagation sand and peat moss.
Cutting plastic or aluminium trays	Injury from using scissors	<ul style="list-style-type: none"> • Supervise scissor use. • Teacher to complete beforehand if deemed unsafe.
Using trays with cut edges	Cuts from sharp edges	<ul style="list-style-type: none"> • Discuss safe handling of trays before use. • Minimise handling of cut edges.
Conversations with external adults	Child safety risks	<ul style="list-style-type: none"> • Follow school child safe policy and state/territory jurisdictions for volunteers in school



Supplement teacher resources

- [Part 2 - Dharriwaa Narran lakes. Living with climate change \(Dreaming Story: 3:00 – 5:00\)](#)
- [Central Western Plains: Narran Lake creation story | Gather](#)
- [Bedtime Stories | Common Ground](#)
- [Groundwater | Ngarrngga](#)
- [AIS: Safe handling and use of potting mix - Australian Science Teachers Association](#)
- [Great Artesian Basin - DCCEEW](#)
- [Great Artesian Basin | Geoscience Australia](#)

Dharriwaa Living with Climate Change videos

- [Part 1 - Dharriwaa Living with Climate Change](#)
- [Part 2 - Dharriwaa Living with Climate Change](#)
- [Part 3 - Dharriwaa Living with Climate Change](#)

CSIRO Science Links

- [Indigenous Research Methodology for drought resilience - CSIRO](#)
- [Sharing knowledge of drought resilience on Country - CSIRO](#)
- [Cultural indicators for drought resilience - CSIRO](#)

Professional Development

- [8 Aboriginal Ways of Learning](#)
- [Narragunnawali - Caring for Country](#)
- [Professional Development for Educators | Ngarrngga | Ngarrngga](#)
- [Narragunnawali - A Matter of Perspective](#)

EXAMPLE – Indigenous Research Methodology IRM - Water Lesson overview

Lesson overview (8 × 60 min lessons)

Lesson	Lesson Duration	Main focus & activities	IRM stage
1. Connecting with Country & IRM	60 min	Acknowledgement of Country. Discuss “What does Country mean?” using key quotes (Rhonda Ashby, Fabila et al.). Record key words (land, water, sky, spirit, family, care, belonging). Introduce Indigenous Research Methodology (relationships, reciprocity, yarning, observing Country). Quick personal reflection: What place in nature makes you feel connected or calm?	Connecting with Country, Positioning & relationships
2. Narran Lakes Dreaming & your local Country	60 min	Read / view Narran Lakes / Dharriwaa Dreaming Story and selected video segment (Part 2 – Dharriwaa Living with Climate Change). Students note scientific ideas about flooding, drying, groundwater, springs . Class/small-group yarning: What is this story telling us about water movement on Country? Then pivot to local Country: students share stories of rain, floods, drought, puddles on school grounds; begin marking likely “wet spots” on a school map.	Connecting with Country, Yarning, Story as data
3. On-Country: Water in our Environment (school grounds)	60 min	Outside: students observe and model water movement on school grounds. Using watering cans, they pour water on different surfaces (concrete, grass, sloped areas) and trace flow paths . They mark observations on a site map and/or take photos. Prompt: Where does water go when it rains here?	On-Country Learning, Observing
4. Mapping & recommending (surface water)	60 min	In class: students create an integrated site map showing where water collects, flows, or causes erosion/areas too wet to use. They annotate maps with simple “indicators of Country” (e.g. puddles, soggy grass, bare patches). Reflection questions: Where did you see water going? Where is Country being damaged or cared for? What could be improved? Students draft 1–2 recommendations for better water management on site (e.g. planting, drains, paths).	Recording Knowledge, Toolmaking, Reflection
5. Groundwater, Gali Gurunha & Great Artesian Basin	60 min	Return to Gali Gurunha / Narran Lakes Dreaming Story and background on the Great Artesian Basin . Use map of basin + local region. Discuss: What can the story tell us about groundwater? How are surface water and groundwater connected? Students brainstorm what they already know about bores, wells, springs and where they appear on their local Country.	Connecting with Country, Story as knowledge, Concept building

6. Planning the ground-cover investigation	60 min	Introduce investigation: How does plant cover affect the way water moves into or across soil? As a class, co-design a fair test comparing 2–3 trays: bare soil, soil with leaf litter/pebbles, soil with grass/groundcover. Students help identify independent, dependent and controlled variables . In groups, they set up trays and write/draw their method in science journals.	On-Country / Model-based Learning, Co-design
7. Running the investigation & collecting data	60 min	Students pour measured volumes of water onto each tray, observing runoff vs infiltration . They record data: time until runoff, volume collected, qualitative notes (erosion, turbidity, pooling). They may take photos/video for later “photo story”. Short yarning circle: What did you see? How did plant cover change the way water moved?	Observing, Recording Knowledge
8. Acting, reflecting & communicating	60 min	Students analyse results (tables/graphs, side-by-side photo comparisons). They answer reflection prompts: How can ground cover help keep water on Country? What other values do plants bring? Students create a tool/product such as a poster, short video, site-plan with recommendations, or oral presentation to another class or principal, explaining how to slow water and care for Country at school, drawing on both Dreaming knowledge and their own data. They also reflect on IRM: relationships, reciprocity, whose knowledge they used and how they will give back.	Reflection & Evaluation, Reciprocity (giving back), Toolmaking

Appendix A Connection to and observation of Country – Activities

A.1 Dreaming Story: Gali Gurunha and Narran Lake Creation

There is a massive songline that goes across this Country that connects us, not just to Narran Lake, but all across the landscape. And that is about having water within. There are sandhills, soaks, and gravel-bed springs that are in the landscape, which come from groundwater. In our language that's what Gali Gurunha means. Gali means water, Guru means hole, and the suffix at the end means in. Altogether, it means water in those holes. The little gilgaays (small, shallow waterholes) hold plenty of water. And when there's green grass in certain places, you know there's a water spring. We know that water on the surface, at some point, soaks into the ground, which returns to these holes to provide water for us. The combination of groundwater and surface water is all connected, and it is part of the Gali Gurunha story. These pathways are dotted all throughout the landscape. The [Gali Gurunha] story is about the serpent, or the crocodile in Yuwaalaraay language called Garriya, who took the water from the surface, and has to give it back. So he goes across the landscape and pops out in different places, including the rivers, the soaks and the beautiful springs. He can travel that way because he is mythical and magical... he can change shape. Gali Gurunha was called upon too, in drought time or whenever it was needed for that water to surface.

The Narran Lake creation story begins at one of the Gali Gurunha springs, where Garriya seized Baayami's wives. He [Garriya] kept shaking all the water down while he was tracked. As he took all the water from the waterholes, he created the riverbeds of the Narran River while on his path toward the main Narran Lake. And that's when the big flood happened, when they cut Gurriya open to get Baayami's wives back. The Narran River is a windy river, and in those bends of the river, that's where the deep waterholes are located. And when those waterholes in our rivers start drying up, we know we're in trouble. And that's why those waterholes are very special. Part of the ceremony is that you have to name the waterholes.

- Yuwaalaraay Traditional Knowledge, Narran Lake Aboriginal Joint Management Committee, 2017.

A.2 Observe Country

- Sit or lie down in an open area and close your eyes. What do you notice? Smells, sounds, light? Create art upon 'waking'.
- Make a soundscape, sit in silence with a book/sheet of paper. Position yourself in the centre of the paper and sketch/note the natural sounds you hear, positioning them on the page in the same relative position. If weather does not permit, consider a recording e.g. Sounds of Narran: waterbirds calling at Narran Lakes (Dharriwaa) on the Lower Balonne floodplain - Flow-MER
- Choose a feature of the ecosystem to draw – a tree, animal, rock formation. Make rubbings of rough bark, leaves or rock-faces.
- Go on a traces hunt. Some animals are hard to find, but you can see their traces – look for scratches in the dirt, chew marks in leaves or gumnuts or scat. Try to work out which animals left them.

A.3 Consider

"I grew up around the Walgett district with five brothers and four sisters, we spent a lot of time around the Namoi River with family and friends. I remember the river water being clear and you were able to see the bottom where we used to dive for mussels, fished, played water games and bathed. We collected snotty gobblers and gum sap off the trees nearby. Being on the riverbank was also a form of meditation, listening to the bird life, hearing the water flow and the smell of eucalyptus and gum trees. Rivers and lakes like the Narran provided life for the natural environment and its habitat, most importantly, the wellbeing of the people."

- Rhonda Ashby, Narran Lake Nature Reserve Aboriginal Joint-Management Committee member (Yuwaalaraay and Gamilaraay, 2017) cited in (Coleman, McKemey, & Coleman, 2017)

- What non-living things did Rhonda pay attention to?
- What living things did she notice?
- What things did she know how to use?
- Consider the Country you grew up on – what did you notice? Are there similarities/differences?

A.4 Watch:

- [Dharriwaa Narran Lakes Living with Climate Change](#)
 - What did you notice about how Jason, Allan and Brenda spoke about Country?
 - What plants/animals did you notice in the video?
- [Through Our Eyes - Native Foods At Narran Lake with Brenda McBride \(Dharriwaa\)](#)
 - What living things does Brenda notice?

- Do you see Country the same way as Brenda? What is similar or different to the way you look at Country?

A.4.1 Link:

- [What Is Country? | Common Ground](#)

A.4.2 Discuss:

- Class/small group discussion e.g. Think-Pair-Share
 - What do you know about Country?
 - Are there any indicators of Country that tell you changes are coming – e.g. when season change, leaves fall from trees, the smell before rain, when magpies swoop.

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