Learning in nature at Cleland Conservation Park

Professional Development session 9 April 2018

Aims

- To get educators and students to use Cleland Conservation Park and Wildlife Park as outdoor learning resources.
- Use ideas from the PD for outdoor learning in Cleland but also transferable to other parks and bush settings.
- Set up a group email for ongoing dialogue and sharing ideas about using parks and other areas for learning experiences and activities.

Background

The PD will focus on the Hartford Track on the southern side of the Wildlife Park car park.

There will be a number of activity stops based around learning concepts tied back to the curriculum.

At each stop concepts will be explained with links to the curriculum and learning activities educators could use with students.

Additionally, there is a virtual tour available online, which contains information from the locations at the PD, with attached information about plants, animals and concepts of interest.

Information from the PD will be available for each educator as well as being attached as a download to the virtual tour.

Initial Stop: Tuning in and getting to know the environment

Suggested activity: Mindfulness in nature

See: In silence, look around the area and slowly take in what you see. Look up and explore the sky, the clouds, the canopy of the trees etc. Look through the layers of the bush and explore the ground. Notice the shadows, shapes, patterns, textures and colours.

Listen: Now close your eyes. Tune in to the sounds of the bush. What can you hear?

Touch: Tune into the sensations on your skin. What can you feel? Can you feel the breeze? Touch a natural object from the ground and explore the textures.

Smell: with your eyes closed, notice what you can smell in the air. Can you smell the scents from the bush?

Extension 1: Go off into the bush for a few moments and find a natural object from the ground, such as a leaf, gumnut etc. Allow yourself to observe the intricate details; shape, texture, colour, pattern with curiosity, as if it’s the first time you have seen it. Use your senses to discover this object.

Extension 2: Find a leaf on the ground. Study it for a few minutes. Put it in a box with everyone else’s leaves. Can you find your leaf?
Stop 1: Interdependence and adaptation

Background information:

Adaptation

The Myrtle Wattle *Acacia myrtifolia* has adapted to living in a drier climate by having modified leaves and having photosynthetic leaf stems called phyllodes which lose less water.

The Beaked Hakea *Hakea rostrata* has modified leaves to cut down surface area available to the sun. They are round and needle like.

Hemi/semi parasitism:

The Native Cherry *Exocarpos cupressiformis* is a hemi or semi parasite that gains its nutrition from surrounding plants roots, (predominantly the surrounding stringybarks) to get food and water, while photosynthesising through its green pine-like foliage. It is also parasitised by the Harlequin Mistletoe *Lysiana exocarpi*. See information on the virtual tour site.

Both the Native Cherry and mistletoe are important food plants for birds and other animals over summer when there is not a lot of other food available. They provide fruit and nectar for birds.
Suggested activities: Inquiry into adaptation (middle primary through to Year 9/10)

Discussion: Revise what plants need for survival and discuss what students observe about the characteristics of the ecosystem, including the abundance of sunlight and the scarcity of water. How do plants get their needs met considering this ‘harsh’ environment? Brainstorm how plants and animals might survive in this environment. Revise existing knowledge on adaptation.

Suggested activity 1: Investigate the Myrtle Wattle and the Beaked Hakea.

Look at all parts of the plant and guess what adaptations they have in order to survive in this environment. (Clue for students: plants lose water through their leaves.)

Extend students by guiding them to investigate the Native Cherry. Scaffold students to think about the relationship between the cherry and the stringybarks, including how the cherry relies on the Messmate Stringybark, *Eucalyptus obliqua* (can be other plants) for water and nutrition.

Possible questions to ask students:
- Why do you think these two plants are together?
- What does one have that the other doesn’t? Think about the stringybark’s deep root system and how they can access more water and nutrients from the soil compared to the Native Cherry.
- Which plant benefits? Which is harmed?

Suggested activity 2 (if mistletoe can be seen): Look at a plant that has mistletoe growing on it.

Possible questions to ask students:
- Do you think this is one plant or two? Find the second plant (mistletoe).
- What makes you think they are separate plants?
- Why do you think it’s there? What do you think the host plant has that this one doesn’t?
- What other plants or animals do you know about that have a special kind of relationship/symbiotic relationship? (i.e. parasitic or mutualist)

In secondary years, learning can be linked to students developing knowledge on plant cells and their roles in photosynthesis. The semi/hemi-parasites can be a hook to discuss plant functions; i.e. the plant's ability to undertake photosynthesis and yet its dependency on the host plant for more nutrients.

**Curriculum links**

Science:

Year 4: Living things depend on each other and the environment to survive (ACSSU073)
Year 5: Living things have structural features and adaptations that help them to survive in their environment (ACSSU043)
Year 6: The growth and survival of living things are affected by physical conditions of their environment (ACSSU094)
Year 8: Cells are the basic units of living things; they have specialised structures and functions (ACSSU149)
Year 9: Ecosystems consist of communities of interdependent organisms and abiotic components of the environment; matter and energy flow through these systems (ACSSU176)
Year 9: Chemical reactions, including combustion and the reactions of acids, are important in both non-living and living systems and involve energy transfer (ACSSU179) (link to photosynthesis)

Geography:

Year 4: The importance of environments, including natural vegetation, to animals and people (ACHASSK088)
Stop 2: Fire

Background information:

Fire occurred in the Australian landscape due to firestick burning and through lightning strikes. Today ecological burns are carried out to regenerate senescing ecosystems and increase their ability to provide varied habitat in an area. Mosaic burning provides variation in habitats (heterogeneity). This caters for a wide variety of animal species with differing needs in relation to feeding, breeding and shelter.

Differences on the two sides of the path (Burnt and non-burnt sites)

With fire (upper side of track)

- Dominated by colonising plants
  - Winged Ixodia, *Ixodia achillenoides*
  - Heath Tea-tree, *Leptospermum myrsinoides*

Without fire (lower side of track)

- Dominated by mature woody shrubs
  - Beaked Hakea, *Hakea rostrata*
  - Silver Banksia, *Banksia marginata*
  - Myrtle Wattle, *Acacia myrtifolia*
  - Native Cherry, *Exocarpos cupressiformis*
  - Shrubby/grassy ground layer

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Winged Ixodia, *Ixodia achillenoides*

Heath Tea-tree, *Leptospermum myrsinoides*

Silver Banksia, *Banksia marginata*

Wire Rapier-sedge, *Lepidosperma semiteres*
Scientific concepts

- Colonising plants
  - Colonising plants are generally herbaceous and fast growing. Their seed is either in the soil or blows into an area. They are plants that do best in direct sunlight and then tend to die out when other woody species take over and shade them out. They hold the soil together and protect other species as they are germinating as well as supplying food sources for animals, predominantly invertebrates.

- Strategies for regrowth after fire
  - Obligate seeders are plants that have become largely dependent on fire to release seed and germinate new plants. Many of these plants have hard woody seed capsules that the heat and smoke from fire triggers seed release and germination. Some examples are banksias and hakeas.
  - Sprouters are plants where the stems die in a fire, but have substantial root clumps from where new growth emerges. Some examples are hakeas and mallees.
  - Epicormic growth. Many eucalypts (not mallees) lose their leaves and finer branches but sprout copiously from the main trunk and stems, allowing the plant to gain energy to grow new branches and leaves.

- How frequency and intensity of fire affect the composition of species
  - Short term frequency favours annuals over woody species that seed after 5 or 10 years.
  - Long term frequency favours woody species that may take a number of years to fruit and set seed.
  - Short term fire frequency may result in grasslands with many herbaceous species including lilies and orchids.
  - Intense fires promote the release of woody seed capsules including hakea and banksia seed.
  - Mosaic burning provides many habitat types that support a variety of animals and their needs which will vary for food, shelter and breeding areas. Immediately after fire an area is unsuitable for foraging, breeding and shelter so it is important to leave unburnt areas.

Suggested activities (middle primary through to secondary)

Spot the differences activity: Invite students to look closely at the upper side of the track compared to the lower side of the track and discuss with a partner what they see. Scaffold students to observe fire scars and differences in vegetation.
Possible questions:
- How are the two sides different?
- What do you think has caused this difference?

Explanation: Building on observations of fire scars, explain that the lower side hasn't been burnt since 1983, whereas the upper side was burnt in 2014. Based on this knowledge and observations, discuss:

- Why do you think the burnt side has the smaller plants and the non-burnt side thicker, woodier plants?
- Introduce terminology of colonising plants (i.e. Winged Ixodia). What might that mean?
- What might the upper side look like in another 10 years and how come?
- What would happen if it was burnt every year?
- How frequently should the bush be burnt?

Explain that even though the lower side might look ‘healthier’, there are plants there that still require fire to germinate, so even though it may seem as though fire is ‘bad’, many plants actually need fire (refer to the hakea and banksia).
Possible discussion points about adaptation

- Is it a surprise that the stringybarks are still alive, considering they have been burnt?
- Revise the concept of adaptation. Explain that fire has been a part of the Australian landscape for thousands of years and that Aboriginal Australians used fire (and still do in some places) as a way to manage the landscape. Considering this, how do you think these plants might have adapted to survive?

In secondary years, observations of fire can be used to discuss the linkages between biotic and abiotic factors in the ecosystem and how ecosystems change in response to environmental events.

Additional resource: Interactive fire history map

- The interactive fire history map can be used to look into the history of controlled burns at particular sites, which can be used to discuss how fire frequency impacts on vegetation.

Curriculum links:

Science:

Year 4: Living things depend on each other and the environment to survive (ACSSU073)
Living things have life cycles (ACSSU072)

Year 5: Living things have structural features and adaptations that help them to survive in their environment (ACSSU043)

Year 6: The growth and survival of living things are affected by physical conditions of their environment (ACSSU094)

Year 9: Ecosystems consist of communities of interdependent organisms and abiotic components of the environment; matter and energy flow through these systems (ACSSU176)

Geography:

Year 4: The custodial responsibility Aboriginal and Torres Strait Islander Peoples have for Country/Place, and how this influences views about sustainability (ACHASSK089)

Year 5: The influence of people, including Aboriginal and Torres Strait Islander Peoples, on the environmental characteristics of Australian places (ACHASSK112)

The impact of bushfires or floods on environments and communities, and how people can respond (ACHASSK114)
Stop 3: Classification

Background information

Classification can be done in many ways. All living things are classified by binomial nomenclature. Genus – *Homo*. Species – *sapien*.

However we can classify living things in many ways. Plants, fungi, animals and other things can be classified by shape, smell, colour and numbers. Parts of plants and animals can be classified.

Suggested activity

*Smell*

Often plants from the same family have similar smells. Therefore smell can be an interactive way to compare and classify plants. Try crushing leaves of the following plants and asking students what they think the plants smell like. What plants smell similar or different to one another?

- Gum leaves, Heath Tea-tree, *Leptospermum myrsinoides* and Common Fringe-myrtle, *Calytrix tetragona* are all from the Myrtaceae family and have similar smells.

- The Twiggy Daisy-bush, *Olearia ramulosa* has a pungent smell which is quite different from those in the Myrtaceae family. The Twiggy Daisy-bush is from the Asteraceae family.

*Shapes/angles*

- Plants can be used to investigate different shapes and angles. Try to find the various shapes and angles present in leaves, nuts, flowers, shrubs, trees, grasses etc. Can you find a right angle in nature? An acute angle? An obtuse angle?

- Look at the Common Flat-pea, *Platyllobium obtusangulum* to observe nature’s creation of the obtuse angle.
Colours

- Try and group plants by colour. Why do you think plants have these colours?
- White/grey – reflects the sun – open ended conversation on why do you think the leaf might be white?
- Green - how many greens can you find?

Textures

- Bark - smooth/ rough bark.
- Leaves - smooth, leathery, furry, spiky.
- Fruit – soft, hard and woody.

Curriculum links:

Science:
Year 7: Classification helps organise the diverse group of organisms (ACSSU111).

Maths:
Foundation: Sort and classify familiar objects and explain the basis for these classifications. Copy, continue and create patterns with objects and drawings (ACMNA005)
Year 4: Compare angles and classify them as equal to, greater than, or less than, a right angle (ACMMG089)
Roving stop 1: Everything has a place

Concepts:
- Animals and plants have needs and provide habitat/resources.
- Animals need food, protection and a place to breed and protect the young.
- Plants need food, water, energy from the sun and a place conducive to their needs.

Suggested activities

Junior Primary:
Activity: Choose a plant or animal. Look around and guess what else in the environment it needs in order to survive. This can be very basic for early years and can be related to student's own personal needs.
Discussion: In Year 2/3, students can then explain what is living and what is non-living in their selection. I.e. an ant (living) needs a plant (living) to eat its seeds, and a rock (non-living) to get shelter from. What makes it living? What makes it non-living?

Middle Primary:
Discussion: Discuss different places in the ecosystem that you can find living things, i.e. in the soil, in the treetops, behind bark etc. If prior knowledge is there, ask students to recap on ecosystem roles (i.e. producer, consumer, herbivore, decomposer etc.).
Activity: Play eye spy with a partner: Find a living thing, and then explain it to your partner without saying what it is. Where was it? What was it doing? Who or what was it interacting with? Use different senses-what does it sound like? What does it smell like etc.?
Extension: Ask the group, what else has been here? Go off for 5 minutes and be a detective. What clues are there of other animals passing through? (scats and tracks). What do you think it was? Why do you think it was here? (food, water, shelter?)

Curriculum links:
Foundation: Living things have basic needs, including food and water (ACSSU002)
Year 1: Living things live in different places where their needs are met (ACSSU211)
Year 3: Living things can be grouped on the basis of observable features and can be distinguished from non-living things (ACSSU044)
Year 4: Living things depend on each other and the environment to survive (ACSSU073)

Roving stop 2: Life cycles

Suggested activity
Through watching plants, animals (invertebrates like butterflies and ants or plants) start to work out what sort of things in the ecosystem/environment the plant or animal needs to go through its life cycle.
Through observing plants and animals in the bush at Cleland Conservation Park/others parks/ in your school gardens and then by undertaking further research back at school.

Curriculum links
Science
Year 2: Living things grow, change and have offspring similar to themselves (ACSSU030)
Year 4: Living things have life cycles (ACSSU072)
STEM ideas

- How can we collect native plant seed safely and efficiently?
- How can we survey cryptic (hard to find) animal species?
- How can we survey to find out what animal species (mammal, reptile, invertebrate) live in holes in the ground?
- How can we survey plant species growing in hard to get at areas like swamps?
- Identifying plant structure (shrubland, open woodland, woodland, open forest etc.) is important for classifying different plant associations. It is determined by the height of the dominant canopy species (trees except in shrublands) and the area covered by the foliage of that species as a % of the whole area of land. How can we measure both accurately in the field?
- Some tracks in the park are used by a large number of people. The heavy foot traffic combined with water from rainfall causes erosion in areas of the park. This in turn washes into the creeks degrading water quality and also spreading a slime mould called Phytophthora that kills stringybark trees and grass-trees. How can traffic be managed to minimise damage to tracks and the spread of Phytophthora?

NRM Education resources and relevant links

Virtual tour

https://roundme.com/tour/252103/view/743134/  
- Has information on plants and creatures that can be found along the track. Please note that the hotspot locations are general, and you will need to look around the area to find the plant.
- Has links to
  - Handout for early learning ideas
  - Handout for primary/secondary learning ideas
  - ID charts and other educational materials.

Examples of NRM Education teacher packs, ID charts etc.

Cleland specific resources


Interactive fire history map

The following steps explain how to navigate this page, which is linked to on the virtual tour.
1. Go to the link above.
2. Click the button on the left hand side of page ‘Start using Naturemaps’.
3. Click the button on the left hand side of page ‘Switch to Layer View’.
4. Zoom in the map to show Cleland. You can zoom either by using your mouse wheel or the + symbol at the top left of the map.
5. On the left hand side of the page find the layer ‘Fire’ and click the + symbol located next to ‘Fire’
7. Put a tick in the ‘Fire Management’ check box
8. You can then select the various options to show how many years back you want to go to look at fires.
Where to from here?

Email group to keep the conversation going

We would like to set up an email group to be able to share ideas with each other and continue networking. Once having trialled any learning activities at Cleland, any other parks or outdoor areas, it would be useful to share successes and challenges and learn from each other. Additionally, it would be great to hear if the virtual tour has been useful for classroom-based learning. We will also send out interesting updates about events, resources and other PDs to you. Finally, if in this process you think of other PD opportunities that would be of benefit educators, please let us know.

Would you like to become more involved in NRM education in the future?

Natural Resources AMLR’s NRM Education program uses a whole-school approach when working with school or preschool communities to plan and manage ongoing sustainability initiatives. This is leading to improved educational and environmental outcomes linked to the Australian Curriculum and the Early Years Learning Framework.

For information on how NRM Education can support your site with your sustainability journey, follow this link:

To register in the Australian Sustainable Schools Initiative SA (AuSSI-SA), follow this link:

Weekly Digest

The NRM Education Weekly Digest contains updates on upcoming events, PDs, case studies, interesting articles on plants and animals and other information relating to Education for Sustainability. To subscribe, follow this link and tick ‘NRM Education Weekly Digest’ in the list of options.