Biological Diversity

Meerkats Toolkit

Stage 6 resource

OUTCOMES CONTRIBUTED TO:

BI-11-03
BI-11WS-01
BI-11WS-02
BI-11WS-03
BI-11WS-04
BI-11WS-05



Welcome to the teacher toolkit

We hope we can help you and your students find inspiration in wildlife through this enrichment project.

Watch your introductory video here.

'Bringing Nature into a classroom can kindle a fascination and passion for the diversity of life on earth and can motivate a sense of responsibility to safeguard it'.

Sir David Attenborough

What is in this package:

- Syllabus-linked activities
- Resources to guide your students through
- Supporting resources to conduct a real-world science investigation

Resources required to best use this toolkit:

- Computer and screen or smartboard
- Internet access

We acknowledge the First Nations People, their past, present and their future generations.

Content Overview

Evolution and Ecosystems – Depth Study

Working Scientifically Outcomes

A student:

- develops and evaluates questions and hypotheses for scientific investigations **BI-11WS-01**
- designs and evaluates scientific investigations **BI-11WS-02**
- conducts scientific investigations to collect data and information **BI-11WS-03**
- selects and processes qualitative and quantitative data and information **BI-11WS-04**
- analyses and evaluates primary and secondary data and information **BI-11WS-05**

Evolution and ecosystems

- analyses the relationships between organisms and their environment using the theory of evolution by natural selection **BI-11-03**

Content

Evolution and adaptations

- Use plant and animal examples to explain how structural, physiological and behavioural adaptations shaped by evolution enable survival in their environment

Enrichment project outline

Design a scientific investigation to test one adaptation of Meerkats that increase their ability to survive in their environment.

To complete your task you will need to:

Part 1 – at school prior to your excursion

- research meerkat environment in the wild to understand where they have evolved to live
- research the structural, physiological and behavioural adaptations they have to aid their survival
- research different types of enrichment
- at school, in a team or class, **design and build a suitable enrichment item** following the below guidelines

Part 2 – at Sydney Zoo

- **bring your item to Sydney Zoo on your set excursion date** for keepers to install in the meerkat habitat
- gather data to investigate how well your enrichment item was used/received by the species and how well it encouraged their use of your chosen adaptation

Part 3 – assess your success

- potentially complete scientific report (your teacher will tell you how they will assess this task).





Meerkats at Sydney Zoo



The meerkats at Sydney Zoo are cared for by a skilled team of **exotic animal zookeepers**. Zookeepers are always on the lookout for new and innovative ways to keep the animals in their care active, healthy and engaged in the world around them.

There are two **mobs** (the collective term for meerkats) of meerkats at Sydney Zoo. One habitat is located near the front of the zoo, across from the Chimpanzee habitat and one is located right next to the restaurant. Visitors can watch this mob of meerkats through a glass wall as they eat their lunch (and the meerkats can watch back).

Each mob has a daily routine where keepers will do a **health check** on each individual to ensure they are healthy, **clean** the habitat and place **food** and **enrichment** out for them. They also get to meet new people daily as part of Sydney Zoo's encounter programs. The meerkats love it as much as the humans do.

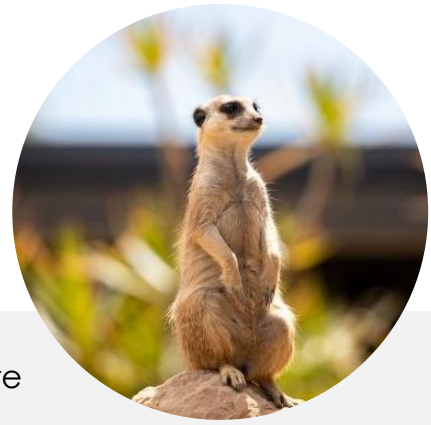
Your mission is to help the zookeeper team keep the two meerkat mobs mentally and physically active by designing and building some new **enrichment** items to engage specific adaptations.

See a tour of their habitats **here**.



Meerkats habitat 1

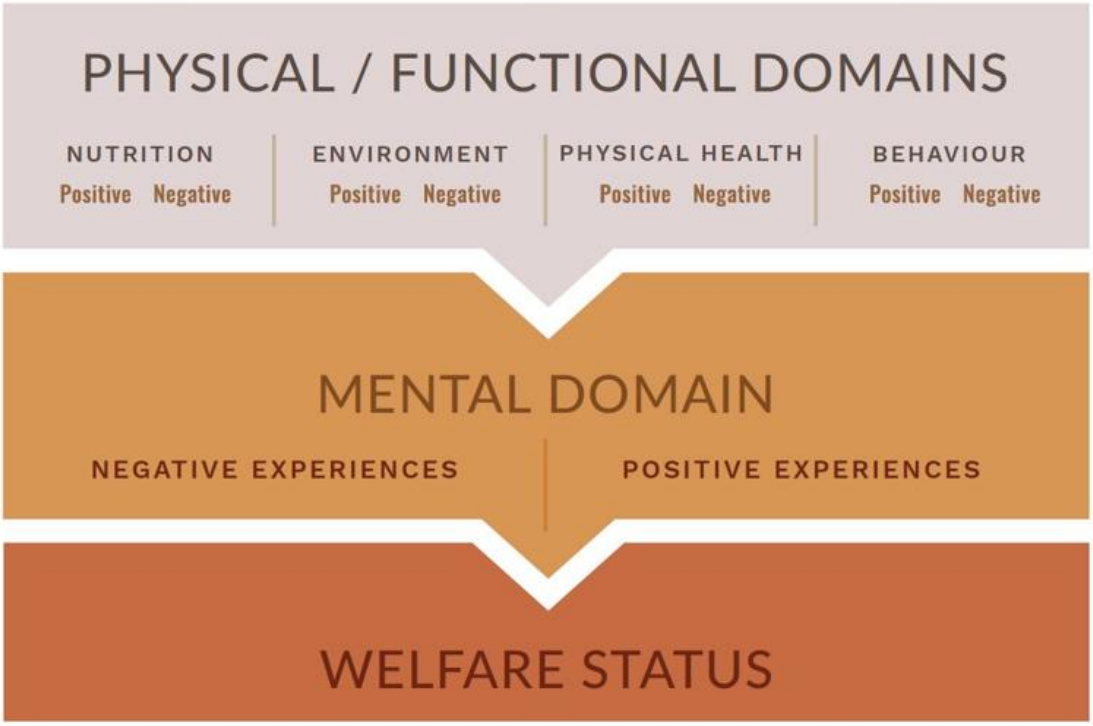
Animal care in a zoo



Zookeepers are tasked with creating a positive welfare state for the animals in their care. What does this mean?

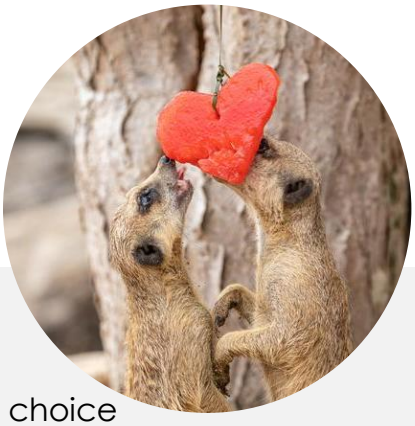
An animal's nutritional needs must be met as well as their physical health needs, environmental needs and behavioural needs. If we do well in providing for the animals in our care then we are also looking after their mental needs and creating a positive welfare state for our animals. The model currently used in our zoo is the 5 domains of animal welfare.

Some people may have heard of the 5 freedoms (freedom from thirst, hunger, discomfort, pain/injury/disease and freedom to express natural behaviours). The 5 domains of animal welfare go beyond these freedoms.



5 domains of animal welfare. *Image from zooaquarium.org.au*

Enrichment



Enrichment is a very important part of creating a positive welfare state for our animals. Different kinds of enrichment will allow the animals to use adaptations, behaviours, have choice in their daily routines and provide for physical and mental stimulation.

Enrichment comes in many forms and there are lots of considerations including, is it:

- safe for the animals (this requires planning and research for your design)
- appropriate for the animal (this requires background research)
- easily used by keepers
- easy to add food to if that is the intention
- easy to clean
- will actually stimulate your animal – see the different types of enrichment below

Types of enrichment

Sensory/ Olfactory	Environmental	Cognitive/ Manipulative/ Toys	Food based	Behavioural/ social
Using sounds, smells, textures for the animals to investigate with their different senses (sight, hearing, smell, touch, taste)	Recreating their habitat in new ways for them to explore, adding new items e.g. rocks and logs, live plants, bubble baths, digging new holes	Chew toys, boxes, training sessions, whole foods they need to take apart or other items they need to manipulate and interact with mouths or claws	Food items that are new, or fed in different ways e.g. freeze into ice blocks, food scattered instead of in bowls	Play recordings of animal calls, using animal scents from other parts of the zoo, allowing interaction (even if only visual) with other animals

Guidelines for enrichment item

Safety of construction – any item placed in a habitat needs to:

- be made of sturdy enough material they cannot bite pieces off, or if they do (e.g. paper or cardboard) they are free from staples, tape, glue, paint or wax
- ensure any moving parts or holes will not entrap any body parts
    - any holes for tunnelling should be minimum 90mm diameter
- be mobile and easy to install and remove from habitats
- be large enough it cannot be swallowed
- not contain any toxic or allergen materials
- be clean and free of potential disease
- be easy to clean if the intent is to use it again
- be able to be firmly secure – if separate parts they should not be able to detach easily, or if it needs to be attached somewhere in the habitat, the fixings need to be secure

Look – At Sydney Zoo we try to use natural looking items and colours to blend into the habitat design, the design should:

- align with the habitat theme
- promote natural behaviour of the animal
- ensure respect of the animal – e.g. not trying to create an unnatural behaviour or look
- use natural items where possible e.g. logs and bark

Food – if your design needs to have food included then it should:

- be easy to clean if reusable
- have a way to easily put food in and remove uneaten food after use
- food used will be crickets, mealworms or kibble

Guidelines for enrichment item

Approved construction materials:

- Wood
    - If purchasing or reusing wood – aim for raw untreated timber and avoid anything with varnish/lacquer/paint
- Paper/cardboard (with any staples, tape, wax, glue removed)
- Hard plastic (with smooth edges)
    - This can be painted with water based (non-toxic) acrylic paints if you wish
- Rubber dog chew toys
- Paper Mache (if not being placed in the water)
    - Flour and water mix instead of PVA glue, newspaper is fine
    - This can be painted with water based (non-toxic) acrylic paints
- Screws can be used to hold items together, as long as no sharp edges protruding
- Shiny surfaces, but if using a mirror opt for plastic not glass to avoid potential glass shards in the habitat if it breaks

Some ideas and notes from the keepers

- They have wanted to trial slow-release feeders (where mealworms and crickets can be placed and they slowly climb out of holes – could be a fake termite mound or other types of slow feeders (something to research)
- Always keen for tunnelling opportunities
- Meerkats love places to climb to be on sentry duty (ensure this is safe to climb e.g. enough ledges to utilise, and it cannot be used against the side of a habitat in case they climb out, can be secured to internal structures or should be safe to stand alone)
- Something where different senses are used
- Something to dig
- They will actively forage for insects so anything that encourages this behaviour
- They are highly social, so any items that encourage social behaviour

Approved enrichment items

Below is the current list of approved and not approved items for meerkats enrichment at Sydney Zoo. If an item you want to use is not on the approved list, this does not mean you cannot use it. Ask your teacher to email us to discuss this as an option.

Sensory/olfactory

Sounds (music, animal calls – anything is fine, even predatory sounds, it provides opportunities for alert/sentry duty natural behaviours)

Scents/Perfumes (not essential oils)

Coffee grinds

Blood (Zoo can provide on the day to smear if requested – pre-approval needed)

Herbs and spices (dried)

Bells

Environmental

Boxes

Mazes

Dig/hide boxes

Bubbles

Food based/feeding

Feed scatter (taken from their daily diet)

Puzzle feeders

PVC puzzle feeder tubes (with suitable holes)

*note any food required for your project will be live mealworms, crickets or potentially kibble – no other food items should be used with your items – the zoo will provide on the day

Cognitive/manipulative/toys

Cardboard boxes

Paper (phone books, wrapping etc)

Fire hose toys

Plastic tubs/milk crates

Coconuts or boomer balls

PVC pipes and tunnels

Behaviour/social

Recordings of animal calls played

Animal Fur/Hair - from within the zoo – if this is required for enrichment item let the education team know through your teacher. We can provide.

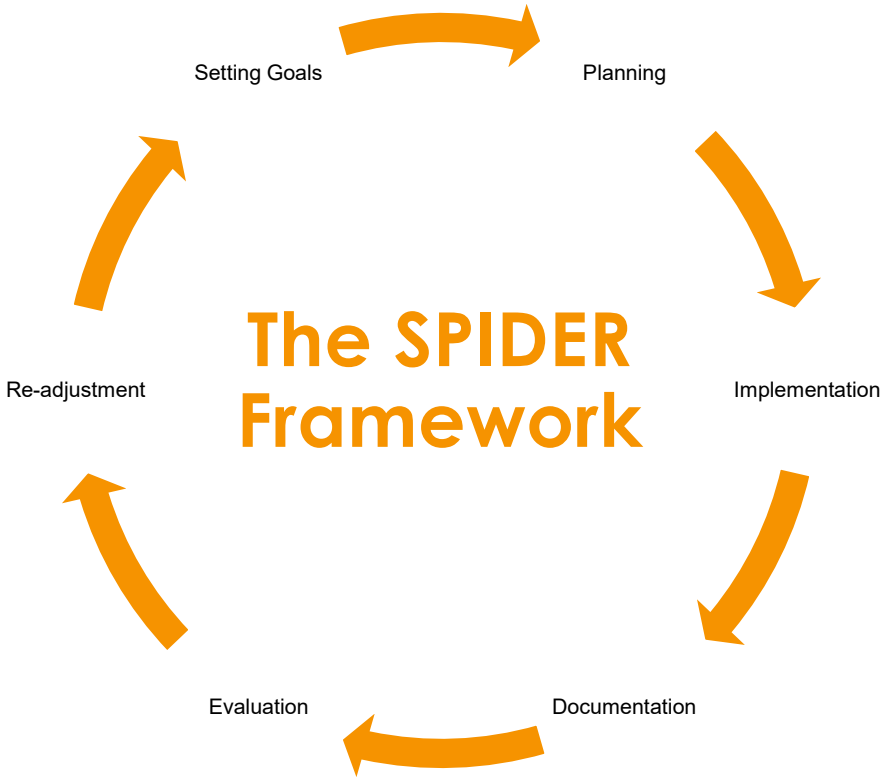
Not approved

Food based items that are not part of normal diet without curator permission

Essential oils (these can be toxic)

Soil or live plants

Planning for success



Zookeepers use the SPIDER framework to create their enrichment. They are constantly setting new goals, evaluating success (and failure) and using what they have learned to readjust for success next time. It is a cycle.

S- Setting Goals

Understanding natural history and behaviours – what is the target behaviour

P – Planning

Enrichment plans and their goals

I- Implementation

Deploying items, adding to calendars and planning tools

D – Documentation

Were the specific goals achieved?

E – Evaluation

Was the enrichment deemed successful?

R – Re-adjustment

Can happen throughout the process and adjust as needed

How do you know you're successful?

Ethograms

Ethograms are one way you can assess the success of your enrichment item. Watch a video about ethograms here.

Scientists and zookeepers alike use them to study behaviour – they can assess how animals use their environment, interact with one another and what they get up to each day. There are multiple ways of doing an ethogram. We need to set up some rules for this first:

- Sampling rule
- Which subjects will you observe (individual or group)
- Where you will observe
- When to observe

Types of behaviour sampling

- Ad libitum sampling (at random when you're there)
- Focal sampling (one animal for a specific of amount of time and recording all instances of their behaviour)
- Scan sampling (one or more individuals are scanned and their behaviour noted at set intervals for a set amount of time – this is what we use in our example)
- Only sampling rare or special events e.g. fighting

Recording rules

Define how you will record your behaviour

- Continuous (record exact time and duration of a behaviour of a set period of time)
- Time sampling (records animal behaviour periodically over a set period of time – this is what we have used in our example)

To know if you're successful you need a baseline – what do these meerkats do when your enrichment is not in their environment? Then comparing it to when they do have this new enrichment item. Does it change their behaviour? Initiate any natural behaviours they were not doing before?

There are other ways of assessing your success. This is just one example.

Ethograms are used to study behaviour

Ethogram

Use this ethogram to gather data on an animals behaviour. You'll need to define behaviours on the left hand side and have a timer ready. Set it for 5 minutes, every 30 seconds record what the animal is doing by placing an X in the appropriate box.

Date: _____ Time of day: _____

Weather (circle all that apply): Sunny Cloudy Raining Cold Hot Storm Windy

Species: _____ Individual description: _____

Behaviour	0 sec	30 sec	1 min	1 min 30 sec	2 min	2 min 30sec	3 min	3 min 30 sec	4 min	4 min 30 sec	5 min



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