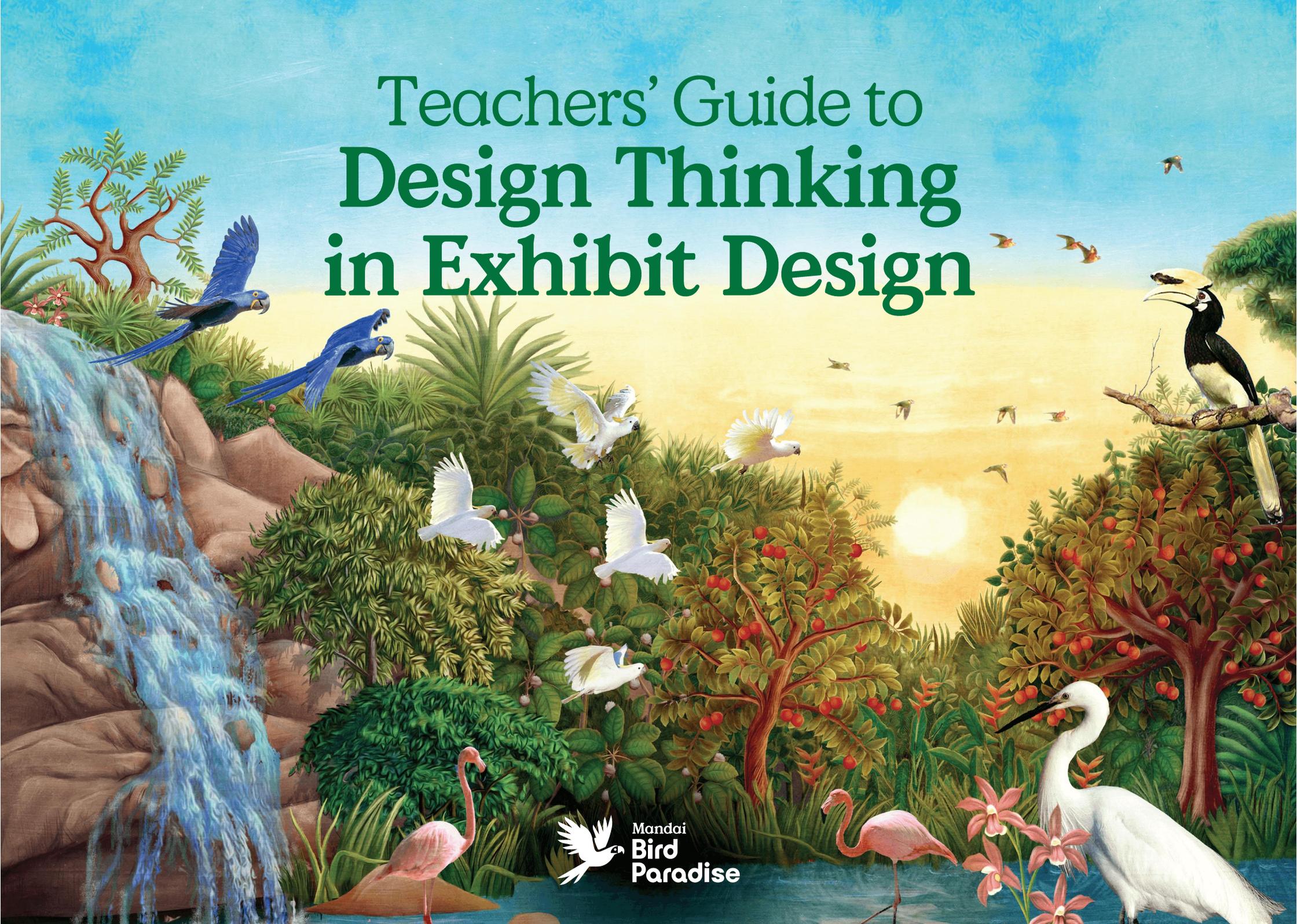


Teachers' Guide to Design Thinking in Exhibit Design



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About This Resource

This resource supports you in conducting a learning journey to use STEM skills to explore avian exhibit design at Bird Paradise.

It is a step-by-step guide to navigating the Design Thinking process and getting your students to develop their ideas for a bird exhibit.

The resource also enables you to facilitate students in gathering and integrating information from various sources and apply them in a real-world design task.

About Design Thinking in Exhibit Design

Exhibit design is a complex process with many considerations for animal welfare, aesthetics, and safety for our animals, staff and guests. Design Thinking helps you and your students integrate design with other STEM topics such as animal biology, engineering and material science to develop an idea for a bird exhibit.

Using Design thinking as an approach helps students break down the problem into logical steps and innovate solutions which are user-centric. The five steps in Design Thinking are:



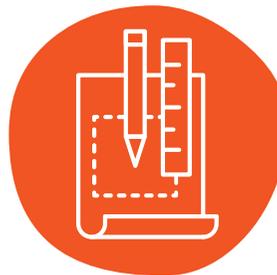
Define



Empathise



Ideate



Prototype



Test

Note:

In a typical Design Thinking process, defining the problem usually comes after a phase of discovery and empathy with the user. For this activity, the task has been defined for you so we have placed it as the first step.

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Step 1: Define The Challenge

About exhibit design in Bird Paradise

We aim to provide the best care possible for the birds in Bird Paradise. Well-designed aviaries and exhibits provide for the birds' physical and behavioural needs and help

them thrive under human care. They also keep the birds, staff and park guests safe while providing guests opportunities to connect with wildlife and nature.

Introduce the task

Let your students know that a bird's exhibit is its home in Bird Paradise. Ask your students to imagine that they are exhibit designers at Bird Paradise.

They are to build an exhibit for one or two of the bird species featured on the right top corner.

Present the Challenge

How might we design an exhibit for the selected bird species so that they can thrive in it?



Weavers



Flamingos



Penguins



Hornbills



Storks

[Back to Contents](#)



Step 2: Empathise

About This Step

Design Thinking is a user-centred design process. In the 'Empathise' phase, students research and observe to uncover the needs of the user, in this case, the type of bird(s) they have been assigned. They do so by:

1 **Researching on the habitats, needs and behaviours of the bird species in class**

2 **Observing the birds and their exhibits in Bird Paradise**

Bird keepers and park guests also use the exhibit. However, we will focus on the **birds as the users** for the purposes of this activity.



Introduce the 'Empathise' Phase

You may want to ask the following questions to get students to start thinking about the birds' needs:

- What do we need to understand before designing a bird exhibit?
- What do living things like birds need to survive?
- Besides air, food and water, what else might a bird need to be physically and mentally healthy?
 - Scaffold: What do you need to be physically and mentally healthy?
- Do all birds have the same needs?

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Step 2: Empathise

1 Research in Class

Use the links provided in the **Links for Research** section of this resource to discover more about the bird species. You may also encourage students to look for their own reliable sources of information.

Encourage your students to find out:

- **What is the bird's natural habitat? Describe it.**
- **Which part of the habitat does it use?**
- **How does the bird move?**
- **What does it eat?**
- **How does it find food?**
- **Is it solitary (lives alone) or social (prefers to live with others of its kind)?**
- **How does it attract a mate and raise its young?**

You may wish to print the **Knowing My Bird** worksheet on [page 19](#) for your students to record what they have discovered.

The worksheet is titled "Knowing My Bird" and is part of the "Design Thinking Step: Empathise" series. It features a header with the Bird Paradise logo and the text "My bird of interest: _____". The main content is organized into three columns, each with a red oval header: "Habitat", "Diet", and "Behaviour".

Habitat	Diet	Behaviour
What is the bird's natural habitat? Describe it.	What does it eat?	How does it move?
Which part of the habitat does it use?	How does it find and get its food?	Is it solitary (lives alone) or social (prefers to live with others of its kind)?
		How does it attract a mate and raise its young?

Logos for Bird Paradise and Teachers' Guide to Design Thinking in Animal Exhibit Design 19 are visible at the bottom.



Step 2: Empathise

2 Observations in Bird Paradise

Visit Bird Paradise and prepare your students to record their observations of the birds and their exhibit.

The birds in this activity can be found in the following exhibits:

At Ocean Network Express Penguin Cove



Penguins

At Nyungwe Forest Heart of Africa



Weavers

At Kuok Group Wings of Asia



Flamingos



Hornbills



Storks

Use the **Observing My Bird** worksheet on [page 20](#) to record these observations:

Design Thinking Step: Empathise

Observing My Bird

My bird of interest: _____

Guiding Questions

Use these questions to make notes about your bird and its exhibit.

- What do you see in the exhibit that helps your bird?
 - To display natural behaviour??
 - Feed as it would in the wild?
- What do you see in the exhibit that helps guests to:
 - View the birds easily and clearly?
 - Feel excited about being with birds?
 - Have fun learning about the birds and how to protect them?
- What do you like about the exhibit? Is there anything about the exhibit you would change?

Draw or write down your observations here!

Bird Paradise Teachers' Guide to Design Thinking in Animal Exhibit Design 20

- **What do you see in the exhibit that helps your bird**
 - **To display natural behaviour?**
 - **Feed as it would in the wild?**
- **What do you see in the exhibit that helps guests to:**
 - **View the birds easily and clearly?**
 - **Feel excited about being with birds?**
 - **Have fun learning about the birds and how to protect them?**
- **What do you like about the exhibit? Is there anything about the exhibit you would change?**

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Step 3: Ideate

About This Step

In this phase, invite students to generate as many ideas as possible for their bird exhibit. These ideas provide the fuel for building prototypes later on.

For an effective ideation session, encourage your students to:

- Be visual (write or draw ideas)
- Build on each another's ideas
- Defer judgement on other's ideas



Facilitating ideation

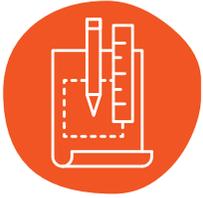
Use the **Bird Profiles** in this resource to remind students of their animals' natural history.

Print the **Bird Exhibit Ideas** worksheet on [page 21](#) with these prompts to encourage a broad spectrum of ideas while keeping students on task:

- How might we improve the exhibit you just saw so that that our bird can [*insert natural behaviour*] better?
- How might we design features that will keep the birds mentally and physically active so that they can stay healthy?
- How might we include features which allow guests to observe the birds up close without the birds getting spooked?
- What materials can we use that are durable and safe for the birds?

Note:
You may want to gather your students in the sheltered huts in the aviaries or the Hubs between aviaries for the Ideation step.

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Step 4: Prototyping

About This Step

In Prototyping, students create iterations of their best ideas to elicit feedback and improve their design. The build-test-iterate cycle helps students to think through doing and understand the user better.

Prototyping is short and quick so that students do not get attached to their ideas and are open to feedback and improvement.

Facilitating Prototyping

- Get students to discuss and agree on one idea to work on.
- Remind them that the prototype needs to show how their idea meets the birds' physical and behavioural needs.
- Let them know that they will need to share their idea using their prototype with the class and receive feedback for improvement.
- Let them know how long they have (15 mins is recommended).



Tips:
This activity is best done in class where there is access to a wide variety of prototyping materials.

Using recycled or natural loose parts is encouraged.

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Step 5: Test

About This Step

Testing the prototype is part of the iterative process to refine the students' exhibit design ideas. In this step, they present their ideas clearly using their prototype and elicit feedback from users.

In this case, you may want to get classmates or a panel

of teachers to roleplay users and contribute comments and questions on the feasibility and utility of their ideas.

The students then record and implement changes to improve their prototypes and arrive at a better solution.

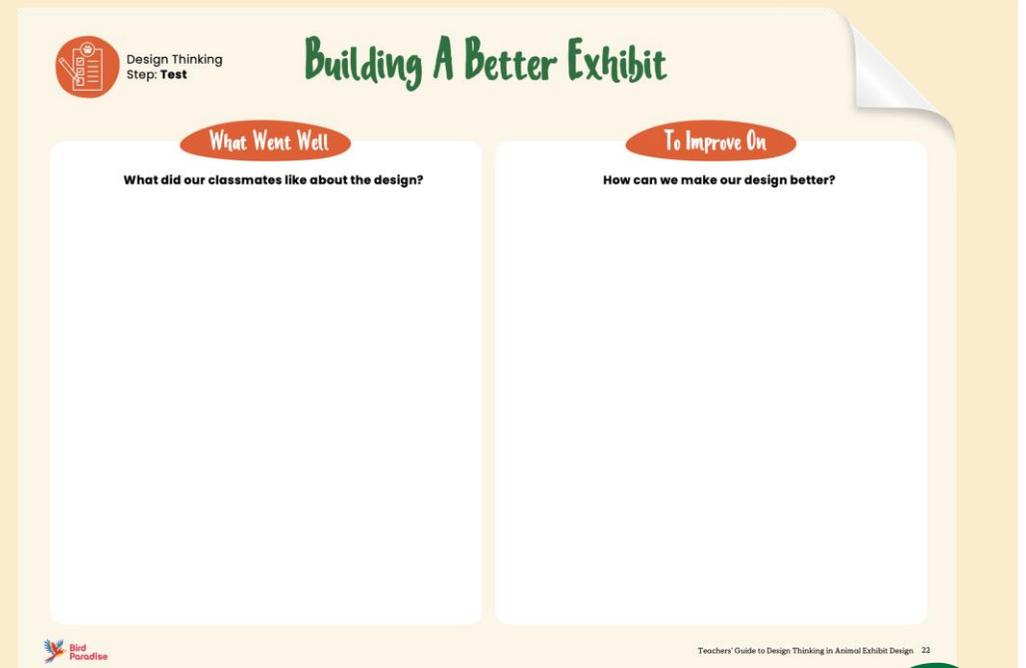
Facilitating Testing

Brief testers

- Testers will need to evaluate prototypes based on how well they meet the needs of the bird they are roleplaying.
- You may want to provide them a copy of the Bird Profile of the bird they are roleplaying as reference.
- Guide them to give feedback what they liked and what can be improved.

Brief presenters

- Let them know that the feedback they receive will help them make their final solution better.
- Have the group make notes of the feedback using the **Building A Better Exhibit** worksheet on [page 22](#).
- Prompt them to think about how to improve their prototype after feedback.



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Links For Research

At Ocean Network Express Penguin Cove



Penguins

- 1 **Basic Information**
www.mandai.com/en/bird-paradise/animals-and-zones/penguin-cove
- 2 **Basic Information**
<https://www.nationalgeographic.com/animals/birds/facts/penguins-1>
- 3 **What makes penguins such good swimmers?**
www.youtube.com/shorts/NMRIZwByUpY
- 4 **Uncovering Penguin Cove's Hidden Features?**
www.youtube.com/watch?v=EdOaten15JA

At Nyungwe Forest Heart of Africa



Weavers

- 1 **Basic Information**
www.nparks.gov.sg/nparksbuzz/issue-16-vol-1-2013/conservation/baya-weavers-nature-s-amazing-architects
- 2 **Basic Information**
singaporebirds.com/species/baya-weaver
- 3 **Nest-building**
www.youtube.com/shorts/F48V_Jvelfo



Flamingos

- 1 **Basic Information**
www.mandai.com/en/bird-paradise/animals-and-zones/heart-of-africa/lesser-flamingo
- 2 **Basic Information**
<https://kids.nationalgeographic.com/animals/birds/facts/flamingo>

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Links For Research

At Kuok Group Wings of Asia



Storks

- 1 Basic Information**
www.nparks.gov.sg/nparksbuzz/issue-45-vol-2-2020/lifestyle/recreation-and-activities/heron-vs-stork-telling-them-apart
- 2 Basic Information**
<https://singaporebirds.com/species/lesser-adjutant/>
- 3 Storks of SE Asia**
<https://www.ecologyasia.com/verts/birds/storks.htm>



Hornbills

- 1 Basic Information**
www.nationalgeographic.com/animals/birds/facts/hornbills
- 2 Papuan Hornbill**
www.mandai.com/en/bird-paradise/animals-and-zones/wings-of-asia/papuan-hornbill
- 3 Papuan Hornbill**
www.facebook.com/MandaiWildlifeReserve/videos/creature-feature-papuan-hornbills/910097626959318
- 4 Oriental Pied Hornbill Breeding**
www.youtube.com/watch?v=dTjVugqqtn0

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Bird Profiles

Different birds have different needs. Use the bird profiles in the following pages to find out about the birds' natural history.



Penguins



Weavers



Flamingos



Storks



Hornbills

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Ocean Network Express Penguin Cove

In this aviary, you can see:



King Penguin



Gentoo Penguin



Northern Rockhopper Penguin



Humboldt Penguin

Habitat

Most penguins live in cool climates. Penguins will go to land to rest, lay eggs and raise their chicks. When penguins moult to replace their old feathers, they must remain on land.



Diet



Fish



Squid



Krill



While penguins cannot fly, they are excellent swimmers. Air trapped in their waterproof feathers help keep them warm and also propel out of water quickly to escape danger.

Adaptations



On land, they waddle or hop. Some slide on their belly - this is called tobogganing.



Penguins dive to hunt for prey underwater. At Penguin Cove, a time feeder discharges fish for the penguins to display this behaviour.

Nyungwe Forest Heart of Africa

In this aviary, you can see:



Black and chestnut weaver



Taveta weaver

Habitat

Weavers are typically found around grasslands.

They build their nests on thin, outer branches of trees, sometimes near or hanging over water too.

Diet



Grains and seeds



Small animals

Behaviour



Males are known to attract females by weaving nests using strips of leaves.



To increase the chances of survival, weavers build their nests in the same area.



You may spot some nests made with fresh green leaves. This means that the nest is new.



Nyungwe Forest Heart of Africa

In this aviary, you can see:



Lesser Flamingo

Habitat

Flamingos are water birds. They are typically found around salt lakes and lagoons. They use mud to build nests.



Flamingo nest

Diet



Algae



Small invertebrates



Seeds

Adaptations



Flamingos are social birds that live in large colonies.



They plunge their heads upside down into the water to feed.



Their webbed feet support them on soft mud and long legs allow them to walk through waters.

Kuok Group Wings of Asia

In this aviary, you can see:



1

Black-necked stork



2

Adjutant stork

Habitat

Storks can be found in various habitats such as wetlands and open fields.

Diet



Fish



Crustaceans



Other small animals

Behaviour



Storks nest on trees.



They hunt by walking through shallow waters with their bills opened underwater to grab prey.



When hunting in the open, storks spread their wings to create a shaded area to lure prey. This is known as canopy feeding.



Kuok Group Wings of Asia

In this aviary, you can see:



Papuan Hornbill

Habitat

Hornbills found in Asia live in forests. They play important roles as seed dispersers and predators.

Diet



Small animals



Flowers



Fruits



Adaptations



Hornbills use their large curved bills to peel off tree bark, grasp fruits or dig for insects.



Hornbills do not build nests. Instead, they look for tree holes to lay their eggs.



The male will use mud to seal up the nest, protecting the female and chicks from predators.



Design Thinking
Step: **Empathise**

Knowing My Bird

My bird of interest : _____

Habitat

What is the bird's natural habitat?
Describe it.

Which part of the habitat does it use?

Diet

What does it eat?

How does it find and get its food?

Behaviour

How does it move?

Is it solitary (lives alone) or social
(prefers to live with others of its kind)?

How does it attract a mate and raise
its young?



Design Thinking
Step: **Empathise**

Observing My Bird

My bird of interest : _____

Guiding Questions

Use these questions to make notes about your bird and its exhibit.

- What do you see in the exhibit that helps your bird:
 - To display natural behaviour??
 - Feed as it would in the wild?
- What do you see in the exhibit that helps guests to:
 - View the birds easily and clearly?
 - Feel excited about being with birds?
 - Have fun learning about the birds and how to protect them?
- What do you like about the exhibit? Is there anything about the exhibit you would change?

Draw or write down your observations here!



Design Thinking
Step: **Ideate**

Bird Exhibit Ideas

My bird of interest : _____

Guiding Questions

Use these questions to help you design an exhibit for your bird.

- What does this bird need in its exhibit? (E.g. penguins need low temperatures)
- What might we have in our design to encourage natural behaviours? (E.g. penguins need water to swim)
- How might we keep this bird mentally and physically active?
- How might we design the exhibit such that guests can get up close without spooking the birds?
- What materials might we use that will be safe and durable for birds?

**As a group, brainstorm as many bird exhibit ideas as you can.
Write or draw them here.**



Design Thinking
Step: **Test**

Building A Better Exhibit

What Went Well

What did our classmates like about the design?

To Improve On

How can we make our design better?

Map of Bird Paradise

Bird Paradise is open daily from 9.00am - 6.00pm
(Last entry at 5.00pm)

Sky Amphitheatre
Animal Presentation*

Predators on Wings	10.30am & 2.30pm
Wings of the World	12.30pm & 5.00pm

* Presentation timings subjected to changes, please refer to our website or Mandai App for the latest timings.



Last Shuttle Timing

- Shuttle Station 1 : 5.30pm
- Shuttle Station 2 : 6.00pm

- Retail** **F&B**
- 1 Bird Paradise Shop
 - 2 Bird Bakery
 - 3 Penguin Cove Restaurant, Penguin Cove Cafe & Shop
 - 4 Tram Kiosk
 - 5 Food Central
 - 6 Crimson
 - 7 Egg Splash Cafe & Shop

Scan the QR code below to download the Mandai App for more information.

Park Rules

- Explore Safely - Stay on designated walking paths
- Respect our animals - No feeding, teasing or plucking of feathers
- No Flash Photography - Avoid blinding or startling the birds
- Smoke-free Park - Designated smoking area is outside the park
- Image Rights - You may be filmed or photographed during your visit

Call for assistance no.: 6100 0694

Legend

Toilet	AED	Escalator	F&B
Nursing Room	Water Refill	Lift	Retail
Shower	Membership & Experiences Centre	Photo Collection	
Multi-faith Room			

