Fogg Dam

How scientists see nature

Lígia Pizzatto & Ruchira Somaweera

Illustrations by Gisela Pizzatto

Overview – for the kids

This book will tell you stories about the animals that scientists have been studying around Fogg Dam (NT) for many years. You will learn what the animals do, how they live, how important they are for the nature and the people, and how some of them are named by the traditional owners of the land – the Limilngan-Wulna people.

We hope you will learn from these stories and maybe one day you can also become a scientist or someone who will protect the environment!

We especially dedicate this book to the Kenyon family and the Limilngan-Wulna people. This is our way to thank them for opening their lands to the studies of the animals.

From the authors

Overview – for the adults

This book is aimed to spread the results of biological scientific research conduced at Fogg Dam (NT) and surrounding areas. For many years, Professor Rick Shine (The University of Sydney) and his team, have been looking into the biology and ecology of the animals in this biodiverse area. The findings of this research contribute to the increase of biological knowledge, plus wildlife and ecosystem conservation. However, the scientific knowledge often does not reach non-scientists. We believe that the bridge between science and the lay community is essential for the educational processes that drive the conservation of nature. Books play an important role in these processes. But this is no ordinary book. It is a very special one. This is a book to thank a very special audience: the indigenous people of these lands.

For all these years of research, the traditional owners have warmly received us and allowed us to do our work in their lands. But, what exactly are we doing here? It is time to put together and present them with our view of what we have been learning in their magnificent land.

This book is designed especially for the kids. We tell stories. Stories of what we see in this land, of what we know about the animals here. But more than words, we tell our stories through images – photographs taken by us and friends, and drawings based on those photographs. Images and stories to remain in the heart of each of us. Images and stories to be passed on through the generations, to always remind us how beautiful and special these lands are. For all of us.

We especially dedicate this book to the Kenyon family and the Limilngan-Wulna people. This is our way to thank them for opening their lands to us.

From the authors

ISBN: 978-0-9873095-0-1
Illustrated by Gisela Pizzatto

Table of contents

Table of contents

Table of contents

Table of contents

Chapter 1

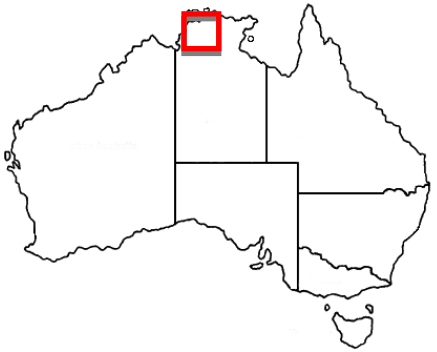
Fogg Dam

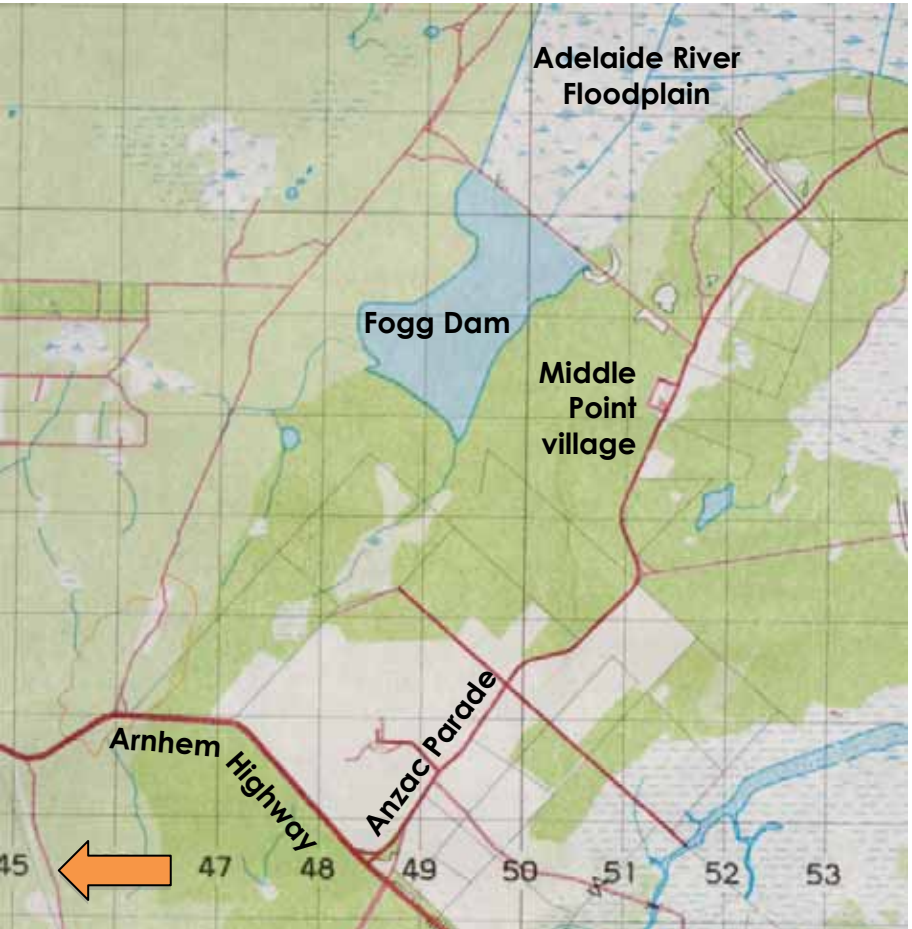
a wildlife paradise in the Top End

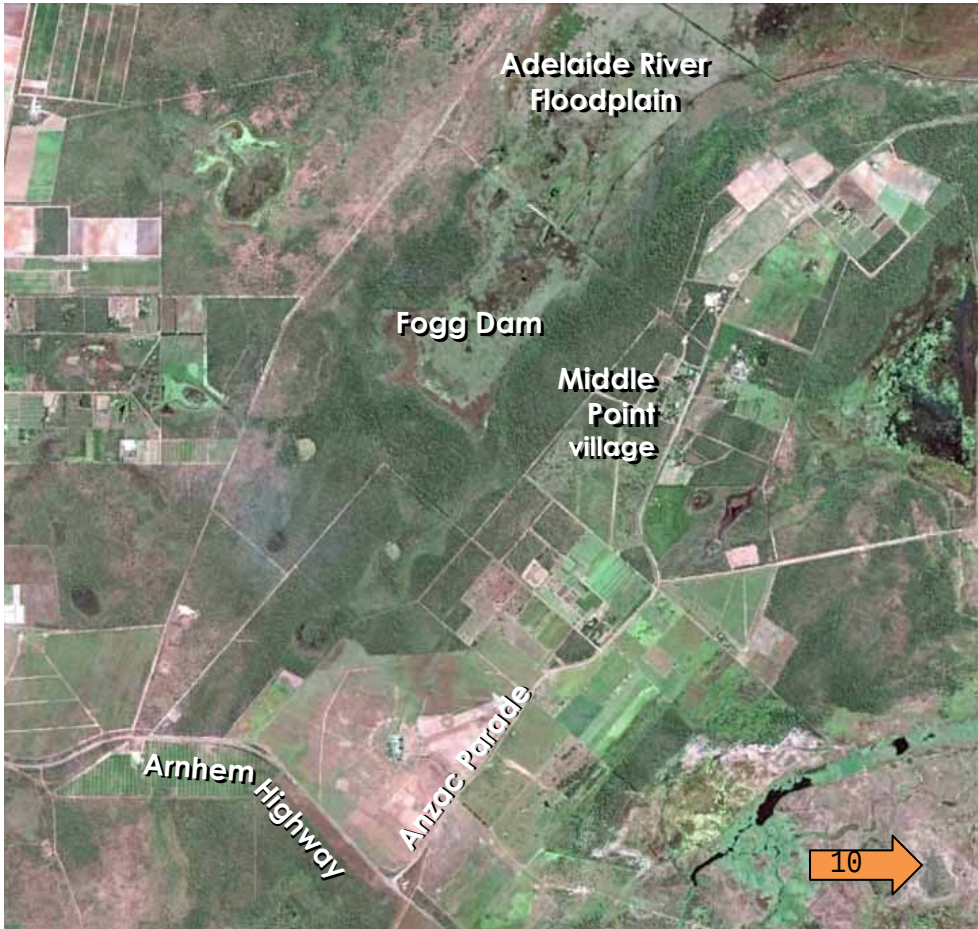
Birdlife at Fogg Dam

Where is Fogg Dam?

- 70 km southeast of Darwin, NT
- In the Adelaide River floodplain







What does it look like?

Late 1955: Rice was planted in the Adelaide River floodplain.

1956: Fogg Dam was built to bring water to the rice fields.

1963: 10 km irrigation channel was built connecting Fogg Dam to the rice fields.

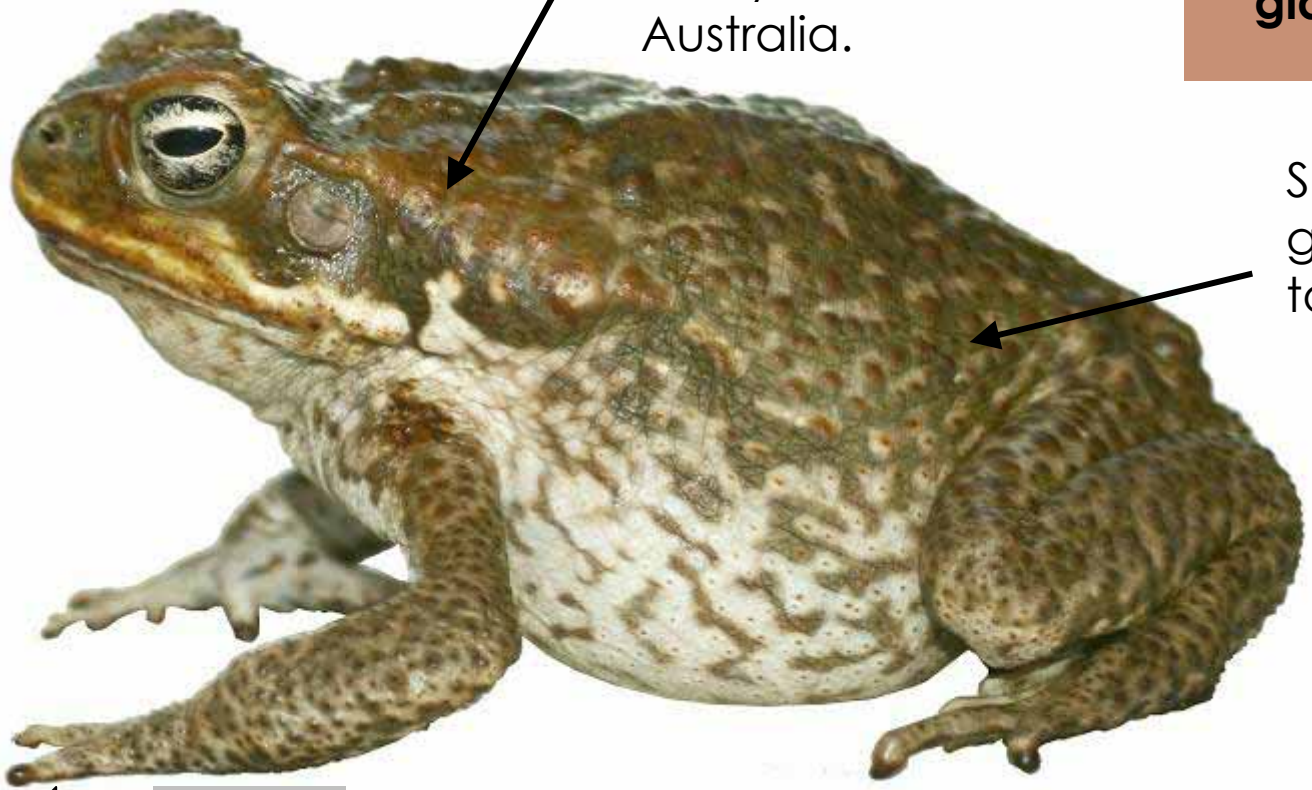
1982: Fogg Dam became a Conservation Reserve. It was named after Mr. J. D. Fogg, the manager of the company Utah Australia, Ltd. who was responsible for the rice project.

Chapter 2

Cane toads

Cane toads are amphibians, like frogs. But they are different: they are large, have drier and warty skin, they lay eggs in strings rather than in clumps, and they have large poison glands on the back.

Main poison glands: white poison is released when these glands are squeezed. This poison can kill many animals in Australia.



Small poison glands cover the toad's body

Where they came from

Cane toads are from South and Central America. They were brought to Australia to eat pest beetles from sugar cane crops in Queensland. They hopped all the way to the Northern Territory, arriving in Fogg Dam in early 2005, and in Western Australia in 2010.

Where people took cane toads to:

1830 – Guyana
1844 – Jamaica
1855 – Bermuda
1920 – Puerto Rico
1932 – Hawaii
1935 – Australia

Who they are

Male
Yellowish skin, rough back with many small warts (feels like sandpaper)

Female
Brownish skin, smoother back with few larger warts

Toads are toxic in all life stages, but eggs have more toxin than tadpoles and metamorphs!

Where they live

Living spaces

Places with shade and moisture in lots of different habitats

Wetlands

Near houses

Grasslands

Forested areas

Little toads must always stay close to the water, at the pond edges, as they can dry up very quickly.

During the day toads will hide: under rocks, in holes, under grass, and in cracks in the mud.

What they eat

In the dry season it is common to see toads sitting on cow poo: they eat the Dung beetles and get moisture from the poo.

Food

Any moving bugs, depending on what they find

Ants (darnman)

Moths (mambirri)

Spiders (larral)

Grasshopers (lalk)

Centipedes (lurluk)

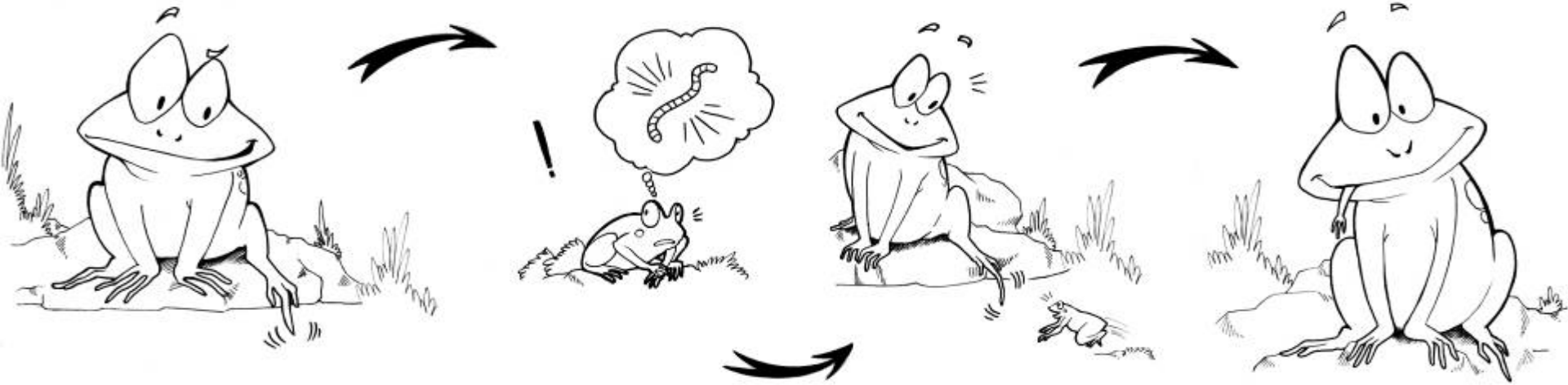
Toad eating toad

Toad tadpoles can smell eggs of other toads and love to eat them!

In the dry season, when there are not many bugs, young toads eat little toads!

Young toads are more active at night.

Little toads avoid them by being more active in the daytime.



Young toad moves its toe. Little toad thinks it is food and comes close. Young toad eats the little toad.

Where they breed

Preferred ponds

- Shallow water;
- Gently sloping edges;
- Muddy banks;
- Short grass or bare ground.

Breeding grasp

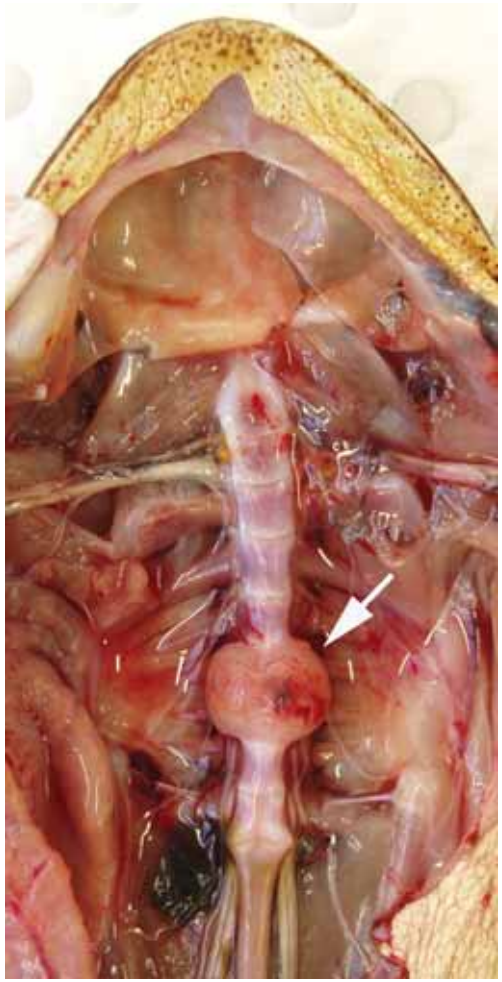
- Males can get confused and grasp another male instead of a female;
- Grasped males call differently and get released;
- While females are grasped they struggle to move and feed;
- After the female releases her eggs in the water the male will release her

Toad diseases

Back problem

- Toads that move too much may get back problems;
- This is called arthritis and makes their spine deformed;
- The lump cannot be seen on the outside of the back of the toad: you need to look inside the toad.

The spine of a healthy toad is thin and straight



Toads with the back problem have a bony lump in the spine

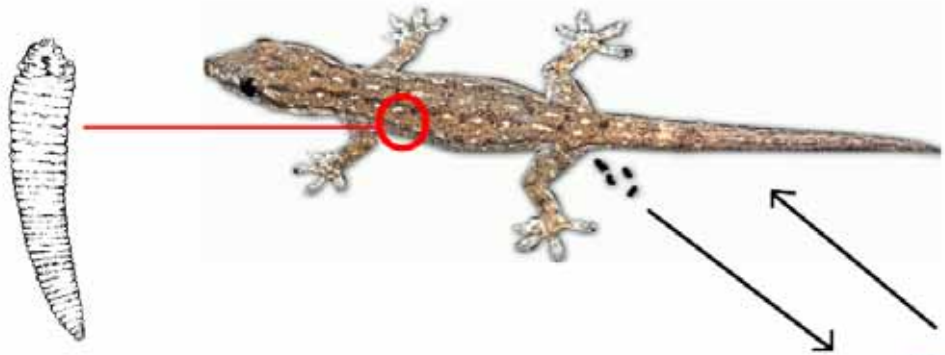
Toad diseases

Parasites

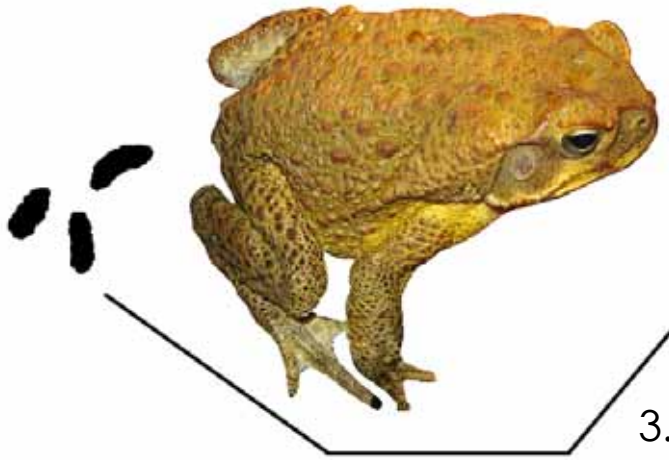
- They are little creatures that live in the body of the toads and can make them sick;
- Some of the parasites of toads in Australia are: the tongue-worms (they have a tongue shape), stomach worms, and lung worms.

How toads get tongue-worms

1. Tongue-worms live in the lungs of the Asian house gecko



2. The poo of the gecko has worm eggs. They hatch into larvae (tiny worms) that will enter and live in a bug.



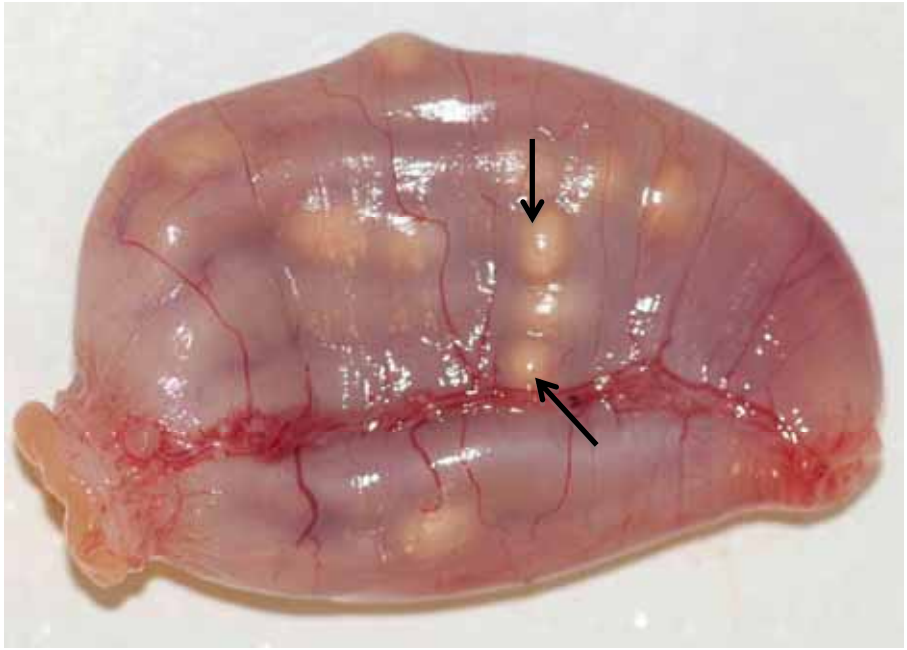
3. Toads, frogs, and geckos get the worms by eating the bugs. The worm will live in their lungs.

4. The poo of toads and frogs will also have worm eggs.

Toad diseases

Stomach worms: cysts

- Toads have many types of stomach worms;
- Some of these also live in the stomachs of native frogs;
- Some do not fully grow inside toads and frogs: they are called cysts;
- Cysts do not make the toad or frog sick;
- If the toad or frog is eaten by a snake, goanna, bird, pig, dingo, cat, quoll or rat, the cyst grows into a worm making these other animals sick.



The cysts of stomach worms look like a yellowish lump.

Toad diseases

Lungworms

- Live in the lungs of the toad, sucking their blood;
- Can also be transmitted to some frogs.

What happens to toads

- Little toads can die;
- Grow slowly;
- Quickly get tired of hopping.

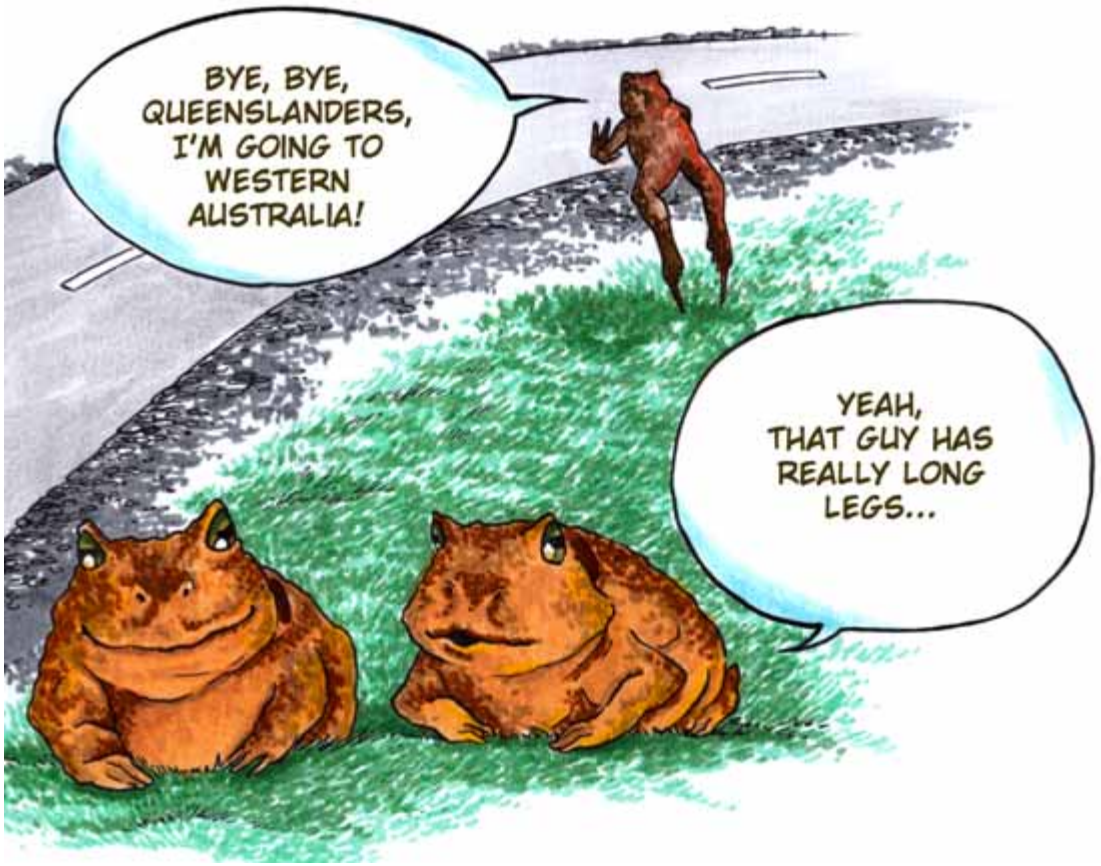
What happens to frogs

- Most frogs do not get this worm;
- Green tree frogs can get it, but they do not get sick;
- Magnificent tree frogs can die from this worm.

Toads get this worm from the soil, poo of other toads, or by eating other toads.

The traveller toad

- Toads hopped away from Queensland to the Northern Territory;
- And from the Northern Territory to Western Australia;
- These travellers have longer legs than toads that stayed in Queensland;
- They can go very long distances before getting tired!



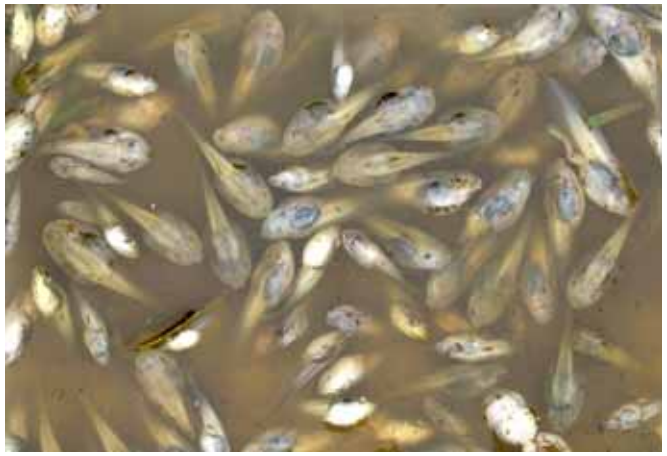
Toads and Australian animals

I. Toads as deadly food

Fishes and frog tadpoles

- Many fishes and frog tadpoles like to eat frog eggs;
- They do not know that toad eggs are poisonous and will eat them too;
- Even just one egg is enough to kill frog tadpoles.

Roth's frog tadpole eating toad eggs



Dead frog tadpoles in a pond: they ate toad eggs

Toads and Australian animals

I. Toads as deadly food

To frogs

- Frogs that normally eat other frogs will try to eat little toads

- Marbled frogs, Dahl's aquatic frogs, and Giant frogs can die from eating little toads


Marbled frog


Dahl's aquatic frog


Giant frog (brown)


Giant frog (green)

Toads and Australian animals

I. Toads as deadly food

To Snakes

- Death adders, Brown snakes and King brown snakes die from eating toads.

To Lizards

- Goannas and Blue-tongue lizards can also die.

Death adder

King brown snake
(alinyman dinyayan)

Goanna (limijidamban)

Toad inside the belly of a dead Blue-tongue lizard

Toads and Australian animals

I. Toads as deadly food

To turtles

- Some species of turtles that eat toad eggs can die.

To mammals

- Quolls attack very large toads;
- Big toads have lots of poison that kills the quolls.


Long-neck turtle


Northern quoll

Toads and Australian animals

II. Toads as not so tasty food

To mammals

- Planigales are small mammals and can only attack little toads;
- The poison of the toads tastes bad and most planigales will not eat the toad after tasting it.


Planigale


Egrets

To water birds

- Herons, Swamphens, and Egrets do not try to eat toads or toad tadpoles;
- They prefer other food: native tadpoles, fishes and insects.

Toads and Australian animals

II. Toads as not so tasty food

To frogs

- Ornate frog, Green tree frog, Long-footed frog, Roth's tree frog, and Rocket frogs do not even try to eat little toads or toad tadpoles;

- Dahl's aquatic frogs try but do not eat toad tadpoles after tasting them.


Ornate frog


Green tree frog


Long-footed frog


Roth's tree frog


Rocket frog


Dahl's aquatic frog

Toads and Australian animals

II. Toads as not so tasty food

To fishes

- Like frogs, some fishes try to eat toad tadpoles, others do not;
- Gudgeons spit out toad tadpoles after tasting them.

To Snakes

- Keelback snakes and some Slatey grey snakes can eat toads;
- Keelbacks that only eat toads do not grow much.


Gudgeon


Keelback snake


Slatey grey snake

Toads and Australian animals

III. Toads as food

To birds

- Chickens can eat toads or drink water where toads have been;

- Kites eat the tongue of road-killed toads, especially during the dry season when there is not much other food on roads for them to eat.


Black kite


Whistling kite

Toads and Australian animals

III. Toads as food

What the Meat ants do:

- Attack toads around ponds;
- Prefer little toads which they can easily kill;
- Prefer toads that are hopping rather than those sitting still.

These Meat ants eat little toads

What the toads do:

- Try to kick the ants and jump away;
- Toads that kick and jump often escape the ant attack;
- Very little toads cannot kick and jump and often die after the ants attack.

Toads and Australian animals

IV. How some animals survive

Learning

- If the animal attacks a small toad or eats just a little piece of a toad tadpole it may not get enough poison to die from it.

- They can taste the poison and will learn to recognize and not attack toads the next time.

The following animals learn not to attack toads after tasting one:

- Dahl's aquatic frogs
- Marbled frogs
- Gudgeons
- Blue-tongue lizards
- Planigales
- Quolls
- Baby freshwater crocodiles

Toads and Australian animals

IV. How some animals survive

Being small

- Some Marbled frogs are born small and cannot fit even a little toad in their mouths.

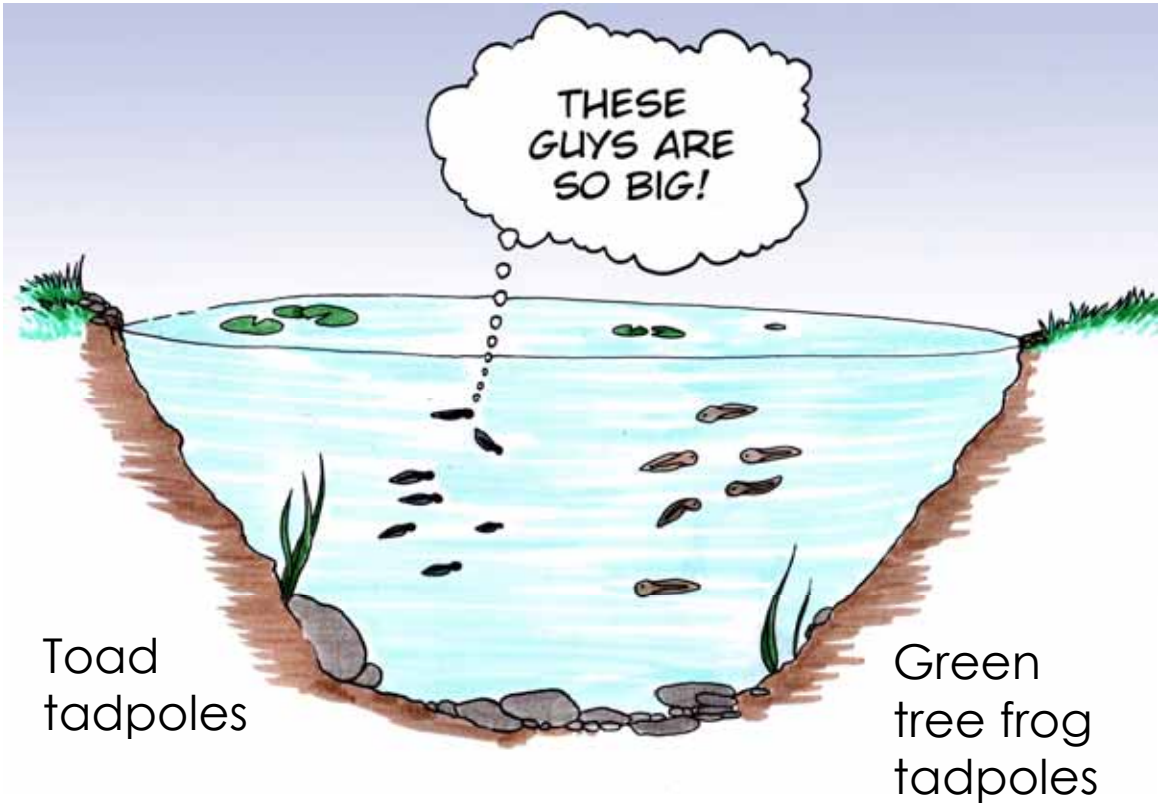
- Some Death adders are born with small heads – they also cannot fit a large toad in their mouths.

Toads and Australian animals

IV. How some animals survive

Being born before the toads

- Green tree frogs often lay their eggs in a pond before the toads lay their eggs.
- The Green tree frog tadpoles grow faster than toad tadpoles and become much bigger.
- They probably eat much of the food in the pond and the toad tadpoles cannot grow well or survive.

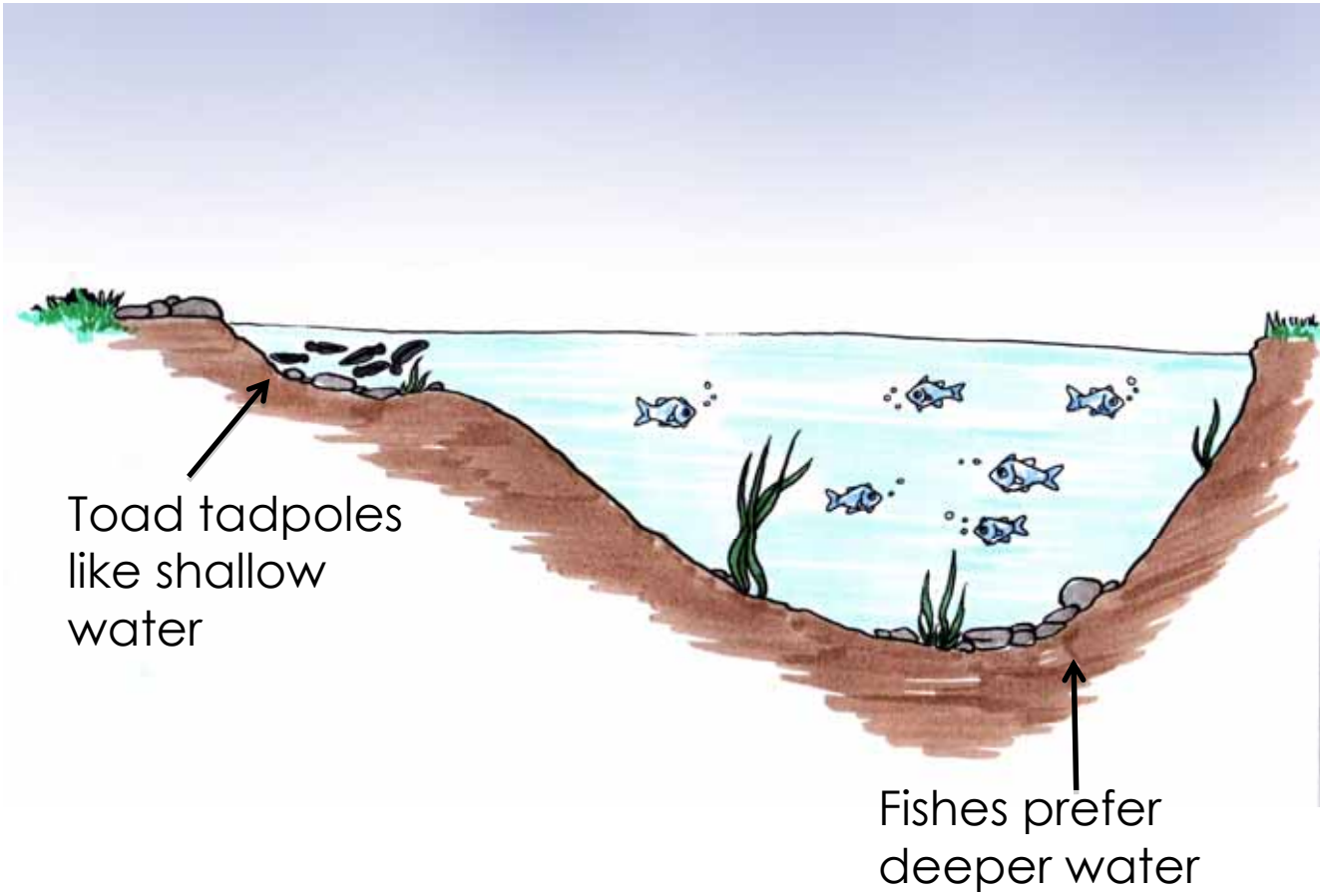


Toads and Australian animals

IV. How some animals survive

Not being where toads are

- Most fishes, and turtles do not live in the shallow waters where toads like to breed.



Chapter 3

Water pythons (lambugay)

at Fogg Dam Reserve

The rainbow serpent: general legend

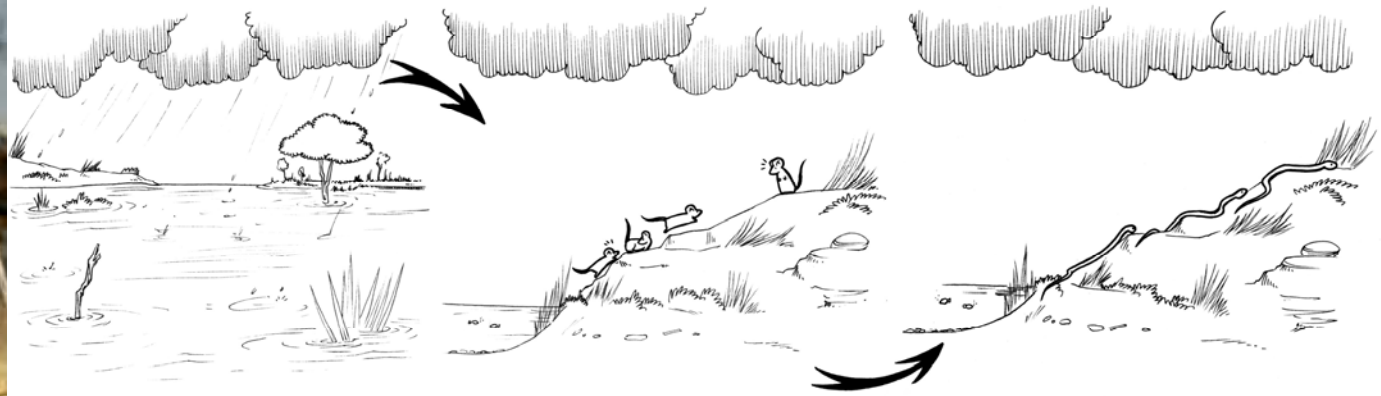
"The giant serpent lives in the water, and brought the water to the earth in the time of creation.

The rainbow serpent is both a giver and taker of life. It can be a strong force of destruction if not respected. Its anger is shown in the form of thunder, lightning, and cyclones. Without the rainbow serpent the rain will cease, the earth will dry out and life will perish".

The Water pythons are the most common snakes in the Fogg Dam area. They like to live close to the water. They are large (up to 3m total length), and not dangerous.

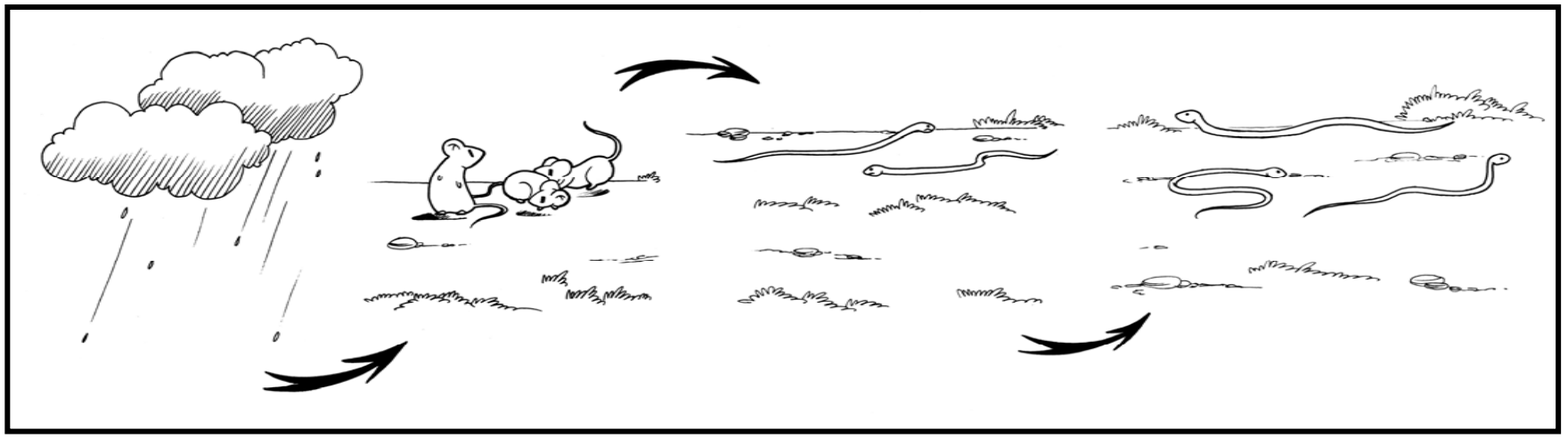
Where they live and what they eat

Favourite habitat: the floodplain

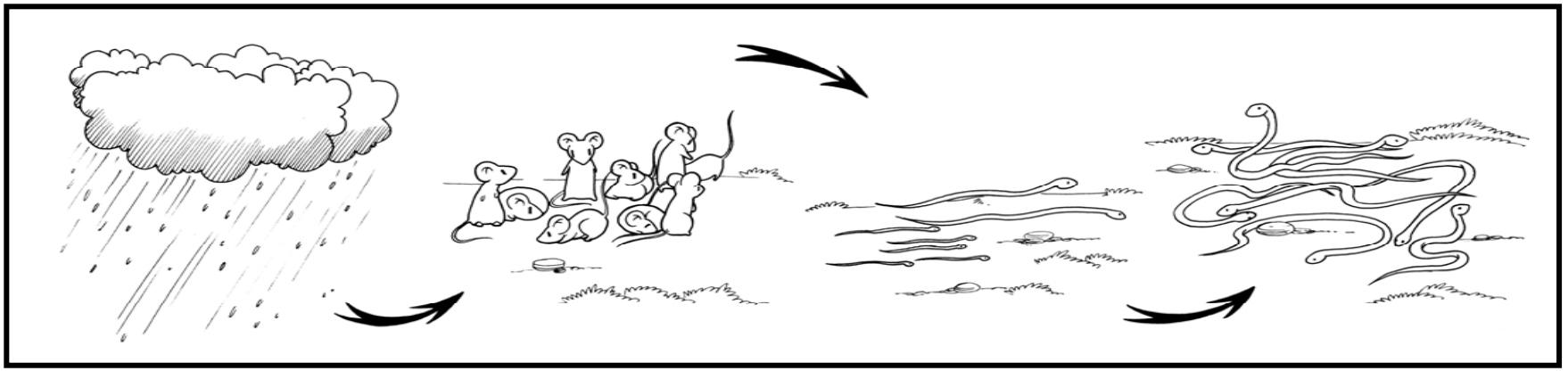


When the floods come, pythons follow the rats up the banks of Adelaide River. When it gets dry again, rats **and** snakes go back to Fogg Dam to breed.

Rain, rats and pythons
(Anyan, luwarli, lambugay)



Too little rain: not enough food for rats and they don't breed. Not enough rats for pythons, they also don't breed, and many die. In these years there are few pythons.



Enough rain: the rats breed and pythons have a lot of food to live and breed. In these years there are a lot of pythons.

How they breed

1.

Some females lay eggs in holes among Paperbark tree roots. These nests are a bit cool.

In cool nests, the mother coils around eggs to warm them up.

2.

Other females lay eggs in goanna holes. These nests are warm so the mother does not need to warm them up.

Babies from warm nests are larger and survive better.

Females are thin after breeding. They need to eat a lot to recover.

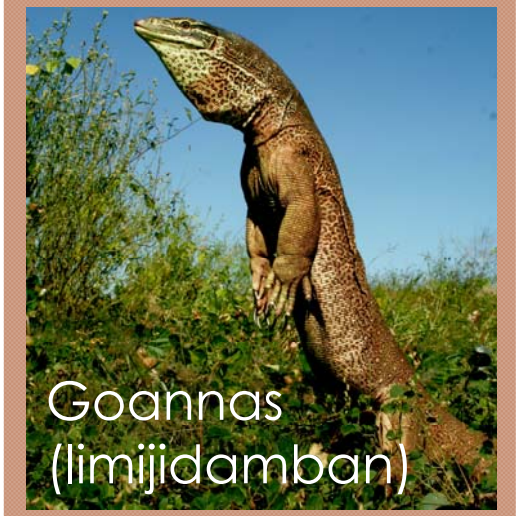
Newborn life

- Baby water pythons hatch in the build-up season and use a little 'egg-tooth' to split open the eggshel
- They prefer the floodplain than pasture areas
- Babies can move over 65m a week and after moving they will rest in the same place for a few days

Predators


Rats (luwarli)


Kites
(lamin binal)


Goannas
(limijidamban)


Adult snakes


Baby water python

Refuges


Ground cracks


Long grass

Chapter 4

Filesnakes (bitjjurnurnu)

Djukbinj National Park

Filesnakes are large, non-venomous snakes that live in billabongs. They are an important food source for some aboriginal communities.

The rainbow serpent

For the Limilngan-Wulna people, the rainbow serpent is Djukbinj. He is a part of the dreamtime story, and a creator.

"If someone disturbs him, he will awaken. He will chase the person who disturbed him, striking with force, destroying the person and the landscape. He currently sleeps in Djukbinj National Park."

Where they live

Where they hide

Dry season

Under roots of trees near the water

Wet and dry seasons

Under floating grass mats

Males and juveniles prefer shallow waters

Females prefer deep waters

Who is who and what they eat

Females

Large and wide head

Large (1– 2m) and heavy (0.5-4kg) body

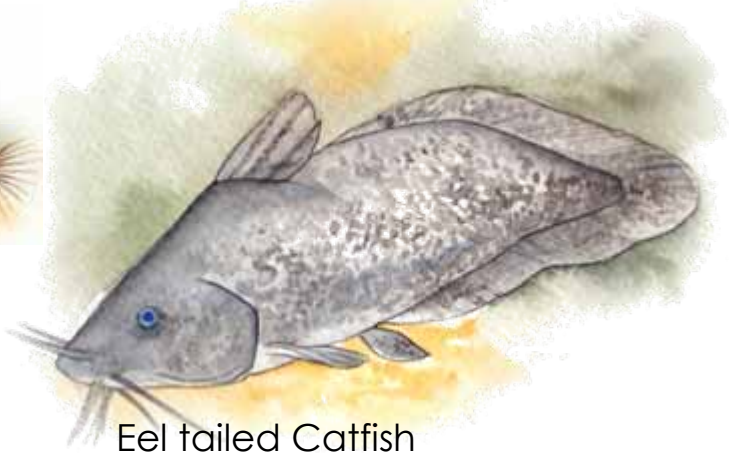
Males

Smaller and narrower head

Smaller (0.9-1.2m), thinner and lighter (0.5-0.9kg) body

Favourite food of larger females

Sleepy cod



Eel tailed Catfish

Glass fish

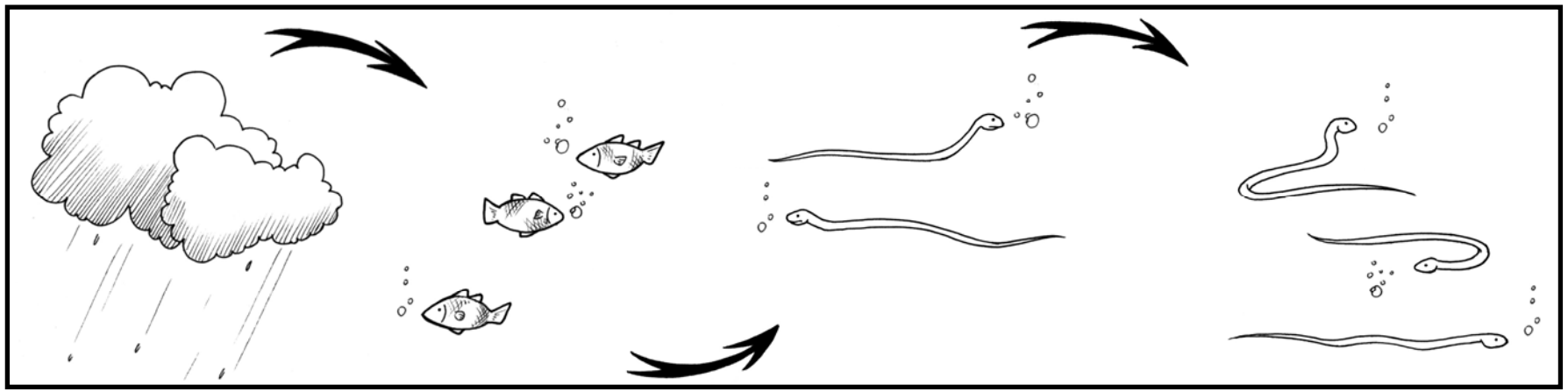
Rainbow fish

Mouth almighty

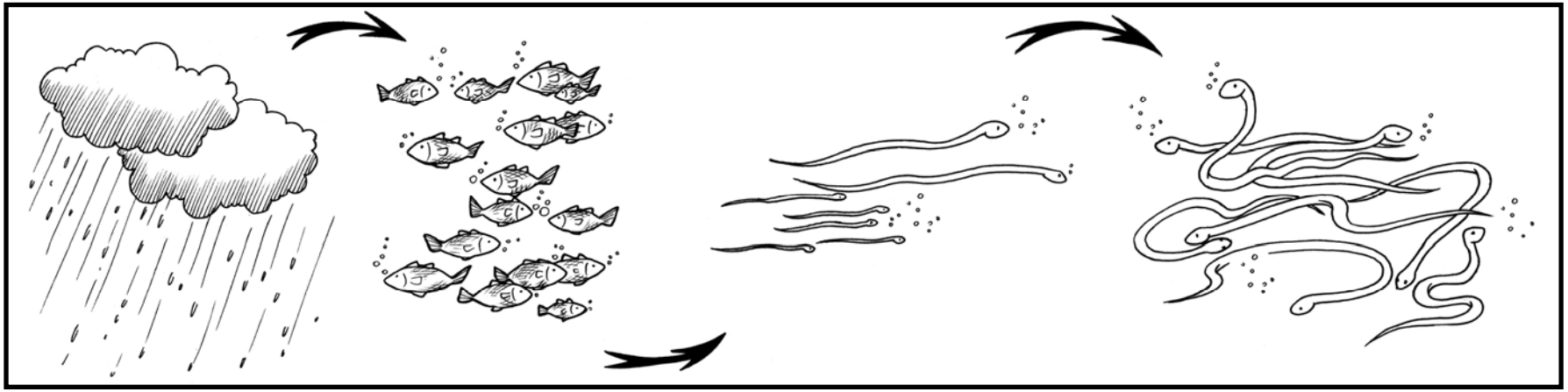
Empire gudgeon

Favourite food of smaller males

Rain, fishes and filesnakes
(Anyan, iwans, bitjjurnurnu)



Too little rain: not many fishes in the billabong. Many snakes don't have enough food and die. In these years there are few filesnakes.



Enough rain: lots of fishes. Filesnakes have a lot of food to live and breed. In these years there are a lot of filesnakes.

Death Adder

These are venomous, medium-sized snakes (up to 1m).

They live in the floodplain. Frogs and lizards are their favourite food.

Death adders are active at night, have a chubby body, and a large head.

How they hunt

Hunting tactics

- Adders coil in the bush, and wiggle their thin and light-coloured tail tip near their head;
- The wiggling tail looks like an earthworm;
- Frogs and lizards approach to check;
- The adder strikes, biting and injecting the venom into the prey. When the prey is dead they swallow it.

Coiling and wiggling the tail near the head

Lizards and frogs think it's food!

How they defend themselves

When death adders feel threatened by a predator or human they try to do several things to protect themselves

Defense

- At first, they try to flee and hide;
- They coil and show their big head;
- They flatten the body to look bigger;
- If these tricks do not scare the predator away, they strike and bite!

Hiding under litter

Coiling and showing the head

Flattening the body

Chapter 6

Crocodiles

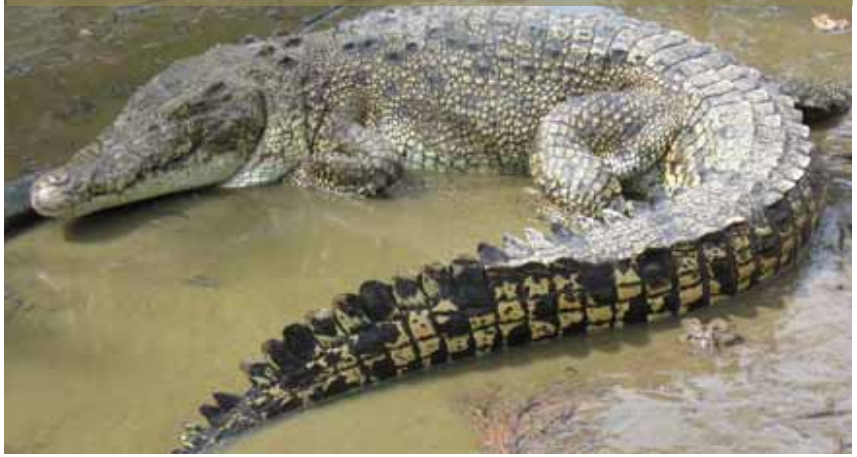
"Long ago, in Dream Time, Yondi the warrior threw his boomerang and it struck a long, rock-like object which suddenly came to life. The object began to writhe. It was Croonar the Crocodile who had been sleeping on the banks of a lagoon. Croonar was angry at being disturbed. He opened his mouth many times and it became very large. All the creatures cowered in fear...

To this day Croonar sleeps in the swamps and lagoons among the mangrove trees, with his wide mouth and rock-like form."

Gumatji people

Saltwater crocodile ('Saltie')

Salties are the largest reptiles in the world (some over 6m), and perhaps the most dangerous. They live in freshwater swamps and rivers, as well as floodplains (like Fogg Dam) and sometimes travel far out to sea.



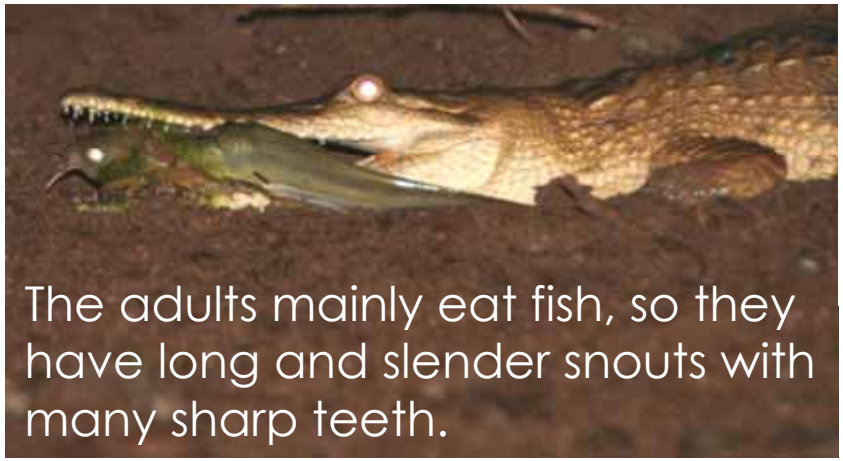
Nesting

They nest during the wet season and the females make a nest out of rotting vegetation. The mum croc stays close to the nest and guards it till the eggs hatch.

Walking on the Dam wall is not a good idea as large salties can come close to the Fogg Dam wall.

Freshwater crocodile ('Freshie')

Freshies are smaller in size and rarely grow over 3m.



The adults mainly eat fish, so they have long and slender snouts with many sharp teeth.

Nesting

Freshies nest during the dry season. The mum digs a hole in the bank and lays the eggs. She does not stay with the nest and guard it, but will come back and help the babies to come out when they start hatching.

How do scientists discover things?

Can you imagine what scientists discover if they:

(Find out the explanations by clicking on the figure!)

Attach spool threads to animals and release them back into the wild?

Look inside a dead animal?

Insert a stick shaped video-camera into a hole?

How do scientists discover things?

Can you imagine what scientists discover if they:

(Find out the explanations by clicking on the figure!)

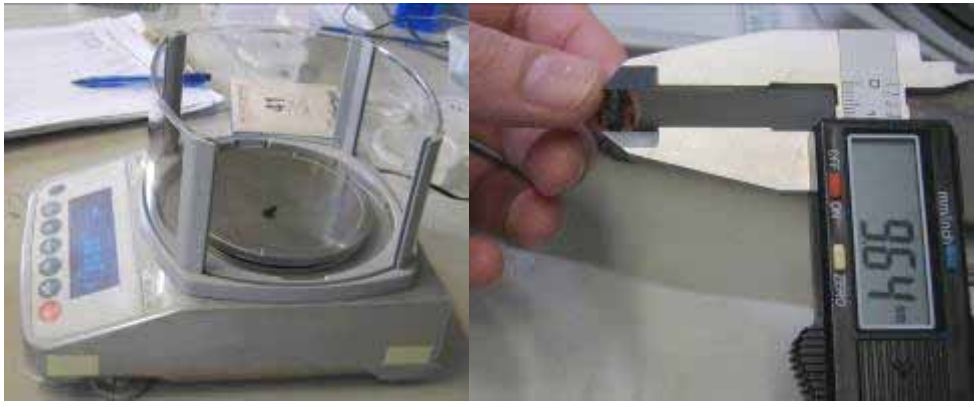
Attach radio-transmitters to animals and release them back into the wild?

Count, measure and weigh eggs and the snake that laid them?

Walk on the Dam wall every night **and** count the animals they see?

How do scientists discover things?

Can you imagine what scientists discover if they:
(Find out the explanations by clicking on the figure!)



Weigh and measure baby toads and frogs?

Study jumping behaviour of toads?

Observe animals with binoculars?

What do scientists discover?

Did you think of any of this?

(Click on the box to go back to the questions!)

Where the animals go and how far they travel (by measuring the thread left behind)!

What do scientists discover?

Did you think of any of this?

(Click on the box to go back to the questions!)

What they eat; why they died; whether they have parasites or signs of diseases inside the body!

What do scientists discover?

Did you think of any of this?

(Click on the box to go back to the questions!)

What animal hides or nests in those holes!

What do scientists discover?

Did you think of any of this?

(Click on the box to go back to the questions!)

Where the animals go and where they hide. They can be followed for a long time!

What do scientists discover?

Did you think of any of this?

(Click on the box to go back to the questions!)

How the number of animals change during different seasons, years, or other events like the arrival of the cane toads!

What do scientists discover?

Did you think of any of this?

(Click on the box to go back to the questions!)

How big the eggs and mother are. By looking at different species scientists discovered that water pythons lay a few large eggs and other snakes lay many small eggs!

What do scientists discover?

Did you think of any of this?

(Click on the box to go back to the questions!)

How big or small they are, and how they grow. Doing so, scientists discovered that the tadpoles living in ponds with many other tadpoles grow into smaller frogs than those living in ponds with only a few others!

What do scientists discover?

Did you think of any of this?

(Click on the box to go back to the questions!)

How fast, high and far the different frogs and toads jump. Different frogs may jump differently, depending on their body and foot shape!

What do scientists discover?

Did you think of any of this?

(Click on the box to go back to the questions!)

What the animals are up to? (e.g. feeding, interacting, playing etc. etc.)

Acknowledgements

This book presents the results of the researches of many scientists including: Prof. Rick Shine, Dr Greg Brown, Dr Thomas Madsen, Dr Ben Phillips, Dr Beata Ujvari, Dr Cathy Shilton, Dr Jonathan Webb, Dr Michael Crossland, Dr Mattias Hagman, Dr Lígia Pizzatto, Dr Matt Greenlees, Dr Christa Beckmann, Dr Crystal Kelehear, Dr Edna González-Bernal, Dr Elisa Cabrera-Guzman, Dr Samantha Price-Rees, Dr Ruchira Somaweera, Daniel Moen, Travis Child, Haley Bowcock, Georgia Ward-Fear, Stefanie OõDonnell, and David Nelson. The research would not be possible without help of the research assistants Melanie Elphick, Adele Haythornthwaite, Michelle Franklin, Nilusha Somaweera, and volunteers. Our special thanks to the crew from Beatrice Hill farm, Coastal Plains Research Station, neighbours of the research station, traditional owners (the Kenyon family), and local rangers, who kindly gave access to the researchers to work in their properties, and parks.

In addition to the authors' photos, the following people kindly provided photos for this book: Crystal Kelehear, Daniel Moen, David Nelson, Greg Brown, Michael Crossland, Michelle Franklin, Matt Greenlees, Ming Tu, Samantha Price-Rees, Ted Kilpatrick (photos #1 and 3 on the rice project), and the National Archives of Australia (photo #2 on the rice project - NAA: A1200, L25298). We thank the teachers of Middle Point school and Humpty Doo Primary school for providing feedback on a preliminary version, Michael Crossland and Rick Shine for proof-reading.

We thank the Friends of Fogg Dam Inc., Ted Kilpatrick, and the NT Parks and Wildlife Commission for help in recovering the history of Fogg Dam. General legend on the rainbow serpent is adapted from the series 'First Australians' (2008, Blackfella Films for SBS: http://dl.nfsa.gov.au/module/1565), and the one on crocodiles is by the Gumatji people (http://ozmagic.homestead.com/australiancrocodileaborigine.html). Legend for the rainbow serpent according to the Limilngan-Wulna, and aboriginal names for the animals were provided by Graham Kenyon and his family.

Fogg Dam – How scientists see nature

About the authors:

Lígia Pizzatto was born in Brazil in 1979. She has a PhD in Ecology from "Universidade Estadual de Campinas", in her home town. She moved to Australia, and is working at the Frog lab, University of Newcastle, after a few years working with Prof. Shine. She is passionate about animals, and researches snakes, lizards, frogs and toads.

Born in 1981 in Sri Lanka, Ruchira Somaweera moved to Australia to study the ecology of freshwater crocodiles for his PhD at Prof. Shine's lab, University of Sydney. Ruchira now works as a senior zoologist at Biologic Environmental Survey (Western Australia), where he conducts surveys and research on a wide variety of Australian animals.

Gisela Pizzatto was born in Brazil in 1977; she is Lígia's older sister. She has a Bachelor degree in History, also from "Universidade Estadual de Campinas". She is a professional artist, teaching and managing her own art school "Anima", in Brazil.

We are currently seeking sponsors to fund some hard copies of this book to be freely distributed in schools in the Northern Territory. If you are interested in helping please contact ligia.oceanica@gmail.com

ISBN 978-0-9873095-0-1

9 780987 309501