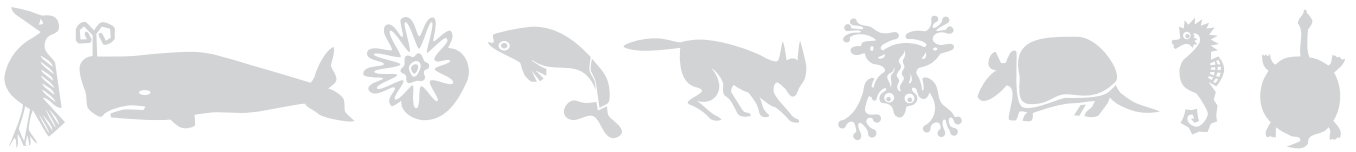
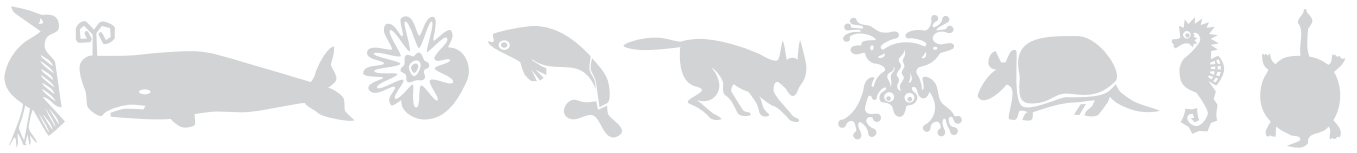


Young Scientists at Work

Endangered, Extinct and on the Brink

Andrew Plant





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Introduction

Evolution and extinction are natural and unavoidable facts of life. In fact, the extraordinary diversity of life on our planet could not exist without them. Throughout geological time, there have been numerous periods of massive upheaval. During some of these periods almost all forms of life were wiped out. As well as these mass extinction events, individual species are constantly evolving or becoming extinct. But are we on the brink of something more serious? Many scientists believe we are at the beginning of a new mass extinction and this time the cause is not natural – it is us.




This book introduces middle and upper primary students to the great problems facing our environment today by examining extinction events throughout time. By studying the past, students are given a broad understanding about how and why life on Earth has changed over geological time. By studying the present, they identify ways in which humans have accelerated the rate of decline of species worldwide. By looking to the future, students are empowered to identify ways in which they can help to reverse this trend.




Endangered, Extinct and on the Brink encourages students to ‘become scientists’ – ask questions, propose and test theories, design experiments and propose their own solutions. Students are also encouraged to make links between our knowledge of past extinctions with issues relevant to the students’ lives today, such as sustainability and biodiversity.






The approach




This book has been designed around a constructivist model. This pedagogical approach suggests that students learn best when they gain knowledge through exploration and active learning. A feature of this approach is the use of hands-on materials, where students are encouraged to think and construct explanations and new ideas for themselves based on existing knowledge, beliefs and skills, rather than simply memorising and reciting facts.



The 5Es model is one method of instruction that supports constructivist teaching and learning. This model identifies five different phases of learning:

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- 1** Engage – students’ interest and curiosity in the topic or question is attracted; they are given the opportunity to make connections with what they already know about the topic or question; they anticipate the learning that will occur; they develop their own questions about the topic or concept
 - 2** Explore – students actively explore the concept or question using hands-on methods; they identify and develop concepts, processes and skills
 - 3** Explain – students are given opportunities to communicate their new understanding or to demonstrate new skills to a wider audience; if necessary, the teacher might introduce definitions and explanations
 - 4** Elaborate – students extend, develop and broaden their understanding by applying their new knowledge or experience to a new or different situation; they discuss and compare their results with one another
 - 5** Evaluate – students reflect on and assess their new understanding and abilities; they may revisit the questions asked in the ‘engage’ phase; teachers evaluate students’ understanding of concepts and development of new skills.



Although this model is described as a linear sequence, it is often appropriate to revisit different stages throughout the learning experience. For example, evaluation will be an ongoing process and should not necessarily be left until the end of an activity.

Science skills

The activities included in this book aim to develop students' understanding of conceptual ideas, and give them opportunities to gain skills and practise working scientifically.

The book aims to develop a range of scientific skills in students, including:

- questioning
- experimenting and following procedures
- observing, measuring and classifying
- collecting and recording data
- hypothesising and predicting
- thinking analytically, critically and creatively
- inferring
- communicating.

The book

Endangered, Extinct and on the Brink has been divided into three sections – the past, the present, and the future – to emphasise the importance of past events in understanding our present, and how both then can affect our future. It aims to encourage students to see extinctions not as isolated events, but as part of larger issues, both natural and man-made.

Each section has been further divided into a number of topics, each posed as a question for students to explore. Each topic includes:

- a reproducible student fact file that contains background information and illustrations to engage students. This may be used for guided reading or to assist students' investigations
- a teacher information sheet that lists the key concepts, cross-curricular links, materials and preparation required, and instructions for guiding students through the activity, including brainstorm topics, discussion questions and assessment pointers
- a reproducible student activity sheet with creative and fun investigations that will allow students to explore and explain the central concept, and then elaborate and evaluate their learning.

The activities promote a range of science skills. Icons have been used throughout the book to denote each activity's focus.



Students design and pursue hands-on investigations and experiments that build on their curiosity and answer their own questions and hypotheses.



Students gather and present information about current scientific ideas to expand their knowledge and understanding, and answer their focus questions.



Students use their knowledge and experience to propose and present solutions to the focus problems.

There is also a glossary of new or unusual words included. (These words appear in bold throughout the book.)

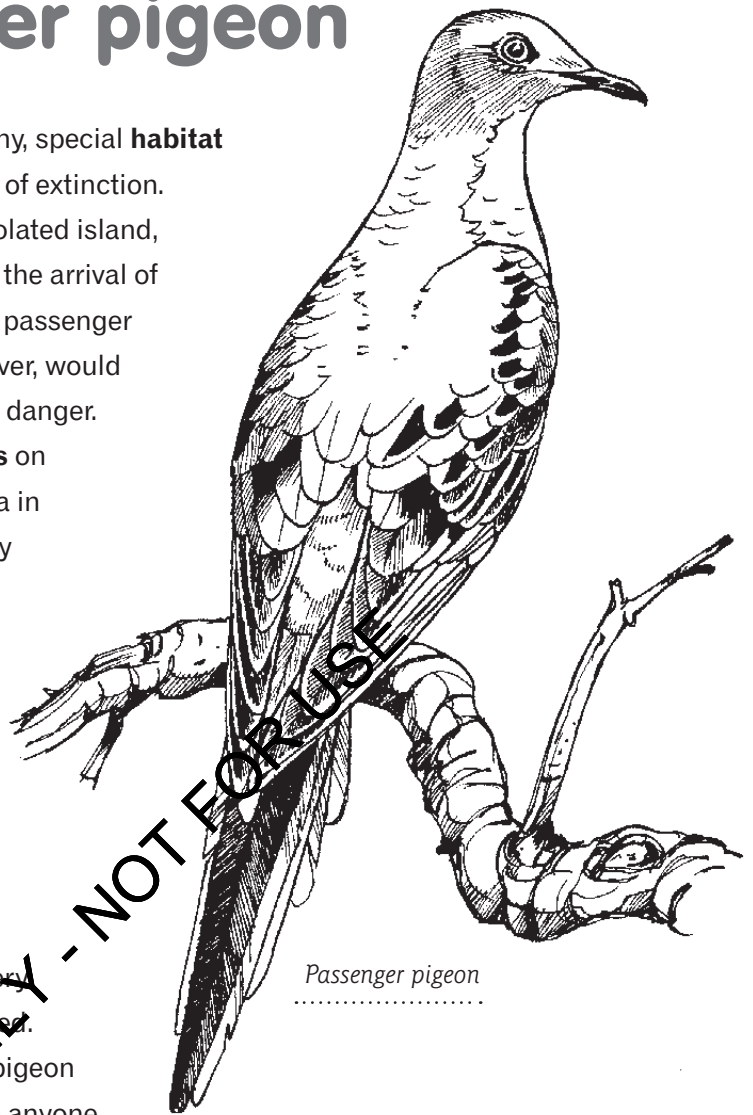


The passenger pigeon

A rare animal or plant that lives in a tiny, special **habitat** is obviously always going to be at risk of extinction. The dodo, a flightless pigeon on an isolated island, was always going to be threatened by the arrival of man and the animals he brought. The passenger pigeon (*Ectopistes migratorius*), however, would seem to have been the last bird in any danger. Once the most numerous bird **species** on Earth, migrating across North America in flocks of up to two billion, it was totally exterminated in about 100 years of commercial hunting.

To us today, the reckless slaughter of these beautiful birds seems unbelievable. Even from an economic viewpoint, it seems crazy that the thousands of people who hunted, prepared, transported and sold the pigeons as food would wipe out the very animal on which all their jobs depended. The problem was that the passenger pigeon was so common – it never occurred to anyone that it *could* be wiped out. Its breeding habits were not understood – it was a communal breeder that needed to be in huge flocks to produce young successfully. Once the numbers started to drop below a critical level, nothing could save it, and its numbers crashed.

A very different group of animals nearly went the same way, through over-hunting, and are still threatened by needless hunting today – the great whales. Once the oceans were full of these immense, intelligent mammals, but some species today are highly endangered. Some nations, such as Japan, continue to hunt them, killing them with explosive-tipped harpoons, despite the fact that there are no products that are produced from whales that cannot be made from an alternative source. Slow rates of reproduction and ocean pollution are threatening the recovery of endangered whales.



Passenger pigeon

For the teacher

Aim

Students will:

- understand the pressure that over-hunting can place on a species
- appreciate the conflict between the conservation and exploitation of a species.

Cross-curricular links

- Literacy: reading, researching information, note taking, drawing conclusions, summarising, creating persuasive text
- Technology: word processing, search, gather and select information
- Art: illustration and data presentation

Materials: library resources, the internet, art and writing materials

ENGAGE

- Distribute the fact file (pp 34–5).
- Brainstorm: Can students name other animals that have been hunted to extinction, or seriously endangered? (Great auk, Steller's sea cow, rhinoceroses, tigers, etc.) Why are endangered animals still hunted?

EXPLORE

- Discuss: If so many scientific organisations do not believe that Japan is whaling for 'scientific research', why are they doing it? Is the so-called 'cruelty' of hunting whales a reason to stop it? Why is the debate over whaling so emotional?
- Research and Report: Distribute the student activity sheet (p 37). There is so much information available on the websites listed on page 35 that students will need to choose carefully what information to include. A ream of printed material stuck to a poster is not research!

EXPLAIN

- Students read their letters to the class. Choose an 'Editorial board' of the 'class newspaper' – perhaps three or four students – to decide which three letters should be published. Discuss why some letters were more persuasive than others.

ELABORATE

- Consider the effect on the extinction of the passenger pigeon on all of the predators that hunted it, primarily birds of prey. How would it have affected them directly, and affected other species that the birds of prey hunted?

EVALUATE

- Have students written accurate and persuasive letters? Have they selected relevant material to present?
- Ask: Have our attitudes to wildlife changed much since the time of the Passenger Pigeon slaughter? Are animals still threatened today by over exploitation?

SAMPLE ONLY - NOT FOR USE



Letters to the editor

STUDENT ACTIVITY

Do the research

A swift, sleek pigeon and a 30-metre long whale might seem like very different animals, yet both have suffered through man's greed and short-sighted attitude. As a class, prepare two fact files that compare and contrast the passenger pigeon and the great whales. Include:

- a physical description of the species, including pictures
- maps showing distribution
- important dates when man's activities impacted the animals
- the reasons that they were hunted, such as the products produced from them
- conservation measures that were enacted to protect them, and their success or failure
- present day threats against whales beyond just hunting.

Now tell the world

- 1 Working in pairs, choose either the passenger pigeon or the great whales as your subject.
- 2 Using the information collected in the class fact files, write a 'Letter to the Editor' that outlines what you believe should be done to protect whales, or what should have been done to save the passenger pigeon.
- 3 Your letter needs to be accurate, persuasive, but not too long or emotional. Remember that keeping a few individuals alive in a zoo is not saving a species – it needs to be able to breed successfully in the wild.
- 4 Share your letter with the rest of the class.

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SAMPLE PAGES