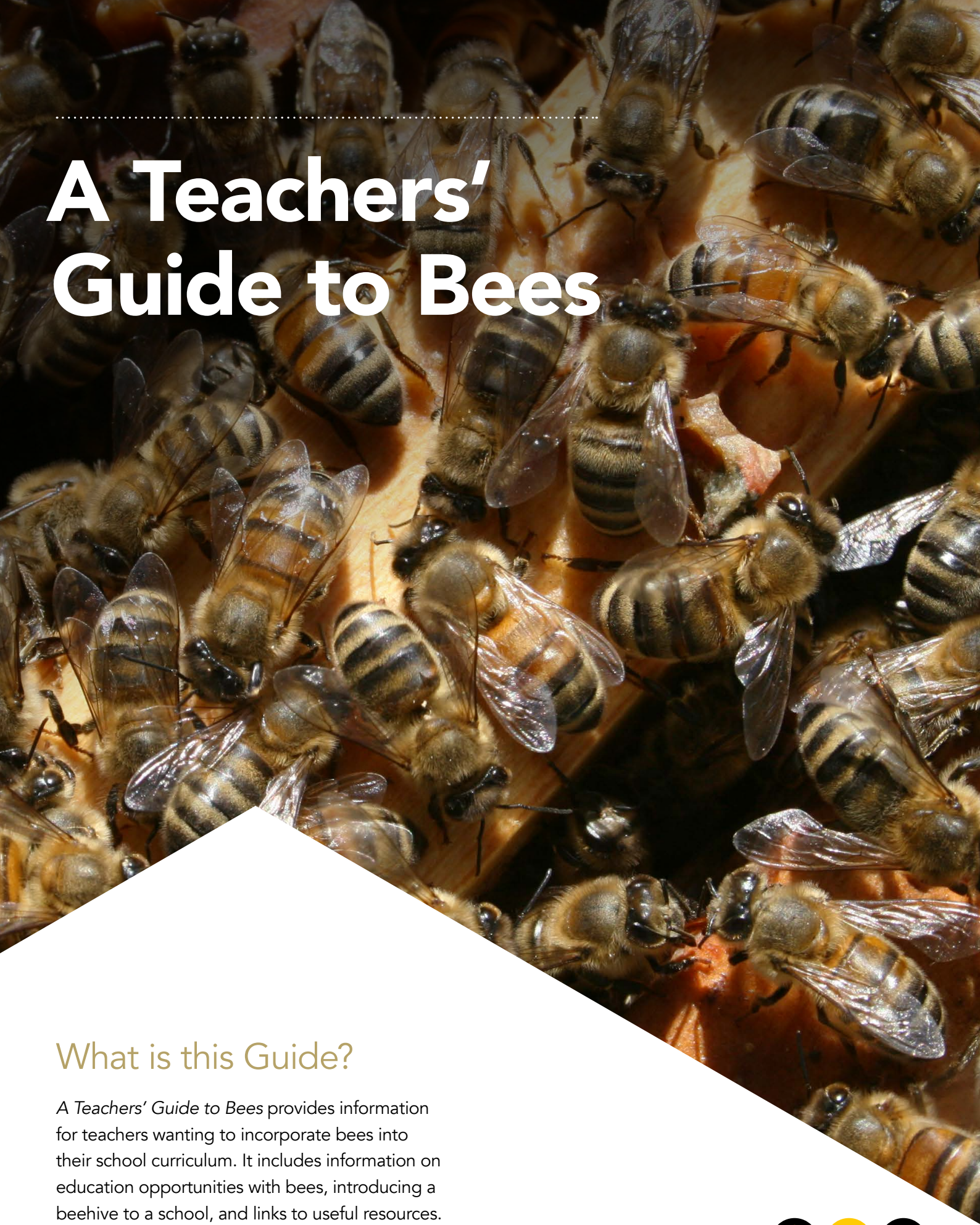
A Teachers' Guide to Bees



What is this Guide?

A Teachers' Guide to Bees provides information for teachers wanting to incorporate bees into their school curriculum. It includes information on education opportunities with bees, introducing a beehive to a school, and links to useful resources.

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Australian native *Trichocolletes leucogenys* pollinating a native bush-pea. (Photo: Kerry Stuart)

Why learn about bees?

In learning about bees, students can experience the joy of scientific discovery and nurture their natural curiosity about the world around them. In doing this, they develop critical and creative thinking skills and challenge themselves to identify questions, apply new knowledge, explain science phenomena and draw evidence-based conclusions using scientific methods. The wider benefits of this 'scientific literacy' are well established, including giving students the capability to investigate the world around them and the way it has changed and continues to change as a result of human activity.

How can my school be involved with bees?

A bee-centric curriculum is as expansive and as in-depth as the imagination! Students can participate in a range of bee-related studies and activities including growing bee-friendly gardens; creating pollinator havens; constructing insect hotels; undertake citizen-science activities to record and observe insect visitors (bee safari!); and maybe even keep a beehive.

What do I need to know?

***A Teachers' Guide to Bees* enables teachers to make informed decisions to ensure:**

- Children's safety (bees are potentially dangerous to people)
- Bees' health and wellbeing (bees require significant care and management)
- Compliance with school, local council and state legislation requirements.

A learning journey with bees

Bees are amazing.

There are over 20,000 species of bees worldwide and Australia has over 2,000 species of native bee. Australia's native bees are highly diverse in colour, shape, morphology, behaviour and size. Australia is home to the smallest bee in the world, the Quasihesma bee (just 1.8mm long) and our largest bee is the Great Carpenter Bee (24mm long).

We can learn a lot from bees.

Honey bees and native stingless bees for example are terrific tools for demonstrating cooperation. When we talk about the 'hive mind' we mean working together for the benefit of the whole community, just like bees because they live together in a colony; rely on each other and work together in highly organised ways; and, divide up essential duties to ensure the colony survives.

Bees are important for food security.

- Bees pollinate one in every three mouthfuls of food we eat.
- Pollinator-dependent food products are important contributors to healthy diets and nutrition.
- The vast majority of pollinator species are wild
- The European honey bee is the most widespread managed pollinator in the world.

Bees are important for biodiversity.

- Bees occupy an important ecological role as pollinators of a range of flowering plants
- Bees are the most dominant taxonomic group amongst pollinators (Patel et al, 2020)
- Australia's native bees have co-evolved with native flora, and many species of native flora rely on native bees for their survival.

Types of bees in Australia.

There are a number of different types of bee in Australia. All play an important role in maintaining food security, biodiversity and ecosystem health.

Native bees — solitary and semi social

Australian native bees can be found across the nation; in cities, suburbs and in rural and remote regions. Most native bee species are solitary and live in hollow stems or in holes in the ground. Schools can best help to support native bees by providing forage and habitat. This can be achieved by planting pollinator friendly gardens and building native bee hotels.

Native bees — stingless

Stingless bees live in colonies just like honey bees. Stingless bees are mainly found in northern and warm-coastal parts of Australia. Stingless bees occur naturally in the wild, but some people (called meloponists) keep native stingless bees in managed hives. These are an ideal option for schools because they do not sting, but they cannot be kept in cooler climates.

Distribution of native stingless bees in Australia.

European honey bees

Honey bees are managed by beekeepers called apiarists. Honey bees have co-evolved over thousands of years with our food production systems. As well as producing honey, honey bees provide essential crop pollination services in Australia for more than 53 leading food crops, underpinning healthy human diets.

Bees and the United Nations Sustainable Development Goals

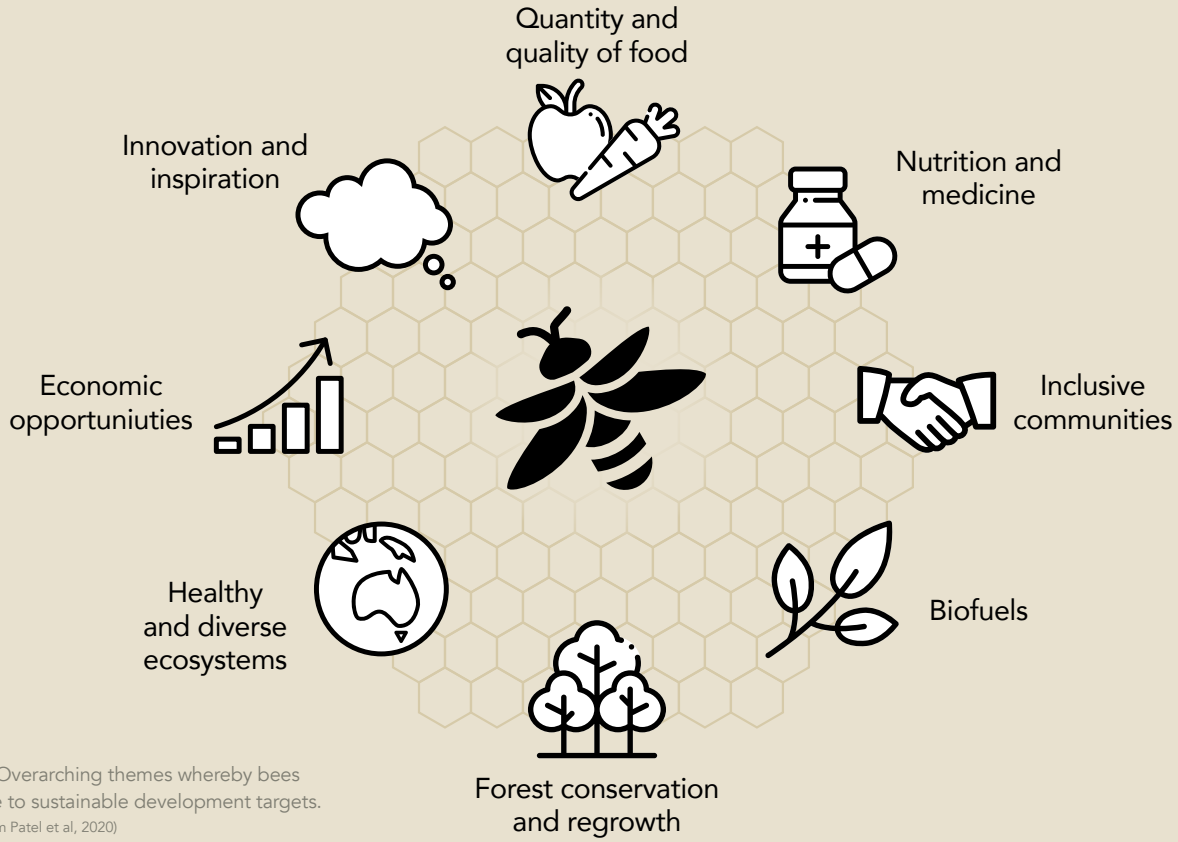

Figure 1. Overarching themes whereby bees contribute to sustainable development targets. (Adapted from Patel et al, 2020)

Bees and the curriculum

Bees are intrinsically linked to sustainability and the sciences.

Bee-centric study units contribute to all 17 of the United Nations Sustainable Development Goals. sdgs.un.org/goals

Study units can focus on the Australian National Curriculum teaching and learning standards for the sciences, incorporating *Science Understanding; Science as a Human Endeavour;* and, *Science Enquiry Skills*. Student enquiry into the role of bees in ecosystems and their role as pollinators; understanding of bees, the threats they face and actions to be bee-friendly. Critical and creative thinking, to be equipped to consider the impact of bees based on social, environmental and economic criteria, and encouraged to take action.

The Wheen Bee Foundation wants your experience with bees to be positive, informative, safe and educational.

References
Patel V et al, 2020, Why bees are critical for achieving sustainable development, Springer Link, https://link.springer.com/article/10.1007/s13280-020-01333-9

The Sustainable Development Goals or **Global Goals** are a collection of 17 interlinked global goals designed to be a "blueprint to achieve a better and more sustainable future for all." The SDGs were set up in 2015 by the United Nations General Assembly and are intended to be achieved by 2030.

Installing a beehive in your school

It's important to know the **A, Bee, C** decision tree when thinking about installing a beehive at your school.

Before you obtain a beehive for your school, we recommend you have established:

All year flowering – sufficient food to sustain the bees (honey bees and native bees)

Bee skills and experience

Compliances – school, local government, state biosecurity and animal welfare standards

European honey bee, *Apis mellifera.*

☑ **Here is a check list to assist in planning and staging a bee-centric school program.**

TYPE OF BEE	Honey bees managed	Stingless bees managed	Wild native bees
TYPE OF HIVE SYSTEM			
ENVIRONMENTAL AUDIT			
Have we assessed the floral resource availability of our school environment?			
• Do we have suitable floral resources to sustain a beehive all year round?			
• Have we provided suitable watering point/s for the bees?			
• Is the site proposed for our beehive safe and suitable?			
• Is the site level and accessible for management?			
• Is the site sheltered from sun, wind and prevailing weather?			
• Is the site removed from lawns than need to be mown or other ground-keeping tasks?			
SCHOOL COMPLIANCE			
Do we have a risk management plan relating to anaphylaxis from bee stings?		N/A	N/A
Have we sought appropriate approvals from school principal and school council?			
Can we commit the time, skills and equipment available to manage bees, particularly in spring to prevent swarming, and over summer and autumn to monitor and manage nectar storage?		N/A	N/A

LOCAL COUNCIL COMPLIANCE				
Have we checked the local council regulations relating to keeping beehives?			N/A	N/A
STATE LEGISLATION COMPLIANCE				
Have we registered our hive with relevant state authority? beeaware.org.au/code-of-practice/registration			N/A	N/A
Have we paid the relevant hive registration fee?			N/A	N/A
Have we read the Australian Honey Bee Biosecurity Code of Practice? honeybee.org.au/wp-content/uploads/2017/10/Australian-Honey-Bee-Industry-Biosecurity-Code-of-Practice-V1-July-2016.pdf			N/A	N/A
Can we comply with all criteria listed in the Code of Practice? – ie…			N/A	N/A
• Understand we have a legal requirement to register all beehives in our care			N/A	N/A
• Have the skills and knowledge to identify pests and diseases that are notifiable			N/A	N/A
• Understand the requirement to regularly inspect hives for pests and disease			N/A	N/A
• Understand our obligation to control or eradicate pests and disease and manage weak hives			N/A	N/A
• Understand our obligation to maintain records of biosecurity actions and observations			N/A	N/A
• Understand each beehive in our care must be appropriately constructed and branded			N/A	N/A
• Understand we must not allow hives to become exposed or neglected			N/A	N/A
• Understand that we may have our operation assessed by a bee biosecurity officer			N/A	N/A
• Have we the time, skills and equipment resources available to conduct regular inspections of hives through spring and summer to:	a) prevent swarming?		N/A	N/A
	b) harvest honey?		N/A	N/A
AND/OR				
Have we contracted the services of an experienced and qualified Apiary Manager to ensure our beehive/school apiary is compliant with the Australian Honey Bee Biosecurity Code of Practice? honeybee.org.au/wp-content/uploads/2017/10/Australian-Honey-Bee-Industry-Biosecurity-Code-of-Practice-V1-July-2016.pdf			N/A	N/A
Can the Apiary Manager provide evidence that they can satisfy the following criteria?			N/A	N/A
• Completed the Beekeeper Biosecurity Training and Assessment Program and/or			N/A	N/A
• Completed an approved pest and disease management course			N/A	N/A
• Have a minimum of 3 years' experience with bees				N/A
• Have passed a working with children check				N/A
SAFETY AUDIT & RISK MANAGEMENT				
Have we identified the risks, obligations and responsibilities for public liability and workplace safety?				
• Have we established how many sets of personal protective equipment we require and what sizes?				N/A
• Do we have a weed management strategy that avoids using chemicals near the hive and is safe for operators (e.g.,whipper-snipping?)				N/A
• Have we a suitably stocked first aid kit and people trained to administer first aid in the event of anaphylaxis, or allergic reactions?				N/A

* This list is provided as a guide only and may not cover all considerations.

Lipotriches species buzz-pollinating a native flax-lily (Photo: Erica Siegel)

Useful Resources

Australia's Green Carpenter Bee	wheenbeefoundation.org.au/our-work/green-carpenter-bee
Australian Pollinator Week	australianpollinatorweek.org.au
Bee Friendly Farming/Gardening	wheenbeefoundation.org.au/our-work/bee-friendly-farming
Bee Resources for Schools	wheenbeefoundation.org.au/our-work/schools-program
Discovering Australia's Native Bees	wheenbeefoundation.org.au/our-work/discoverbees
Planting Guides for Pollinators	wheenbeefoundation.org.au/our-work/powerful-pollinators
Waggle Dance Activity	wheenbeefoundation.org.au/our-work/waggle-dance
World Bee Day 20th May	worldbeeday.org.au

For more information about bee excursions, bee incursions, learning modules and other hands-on bee activities, contact **info@wheenbeefoundation.org.au** or visit **WheenBeeFoundation.org.au/schoolprograms**

Australian native reed bee, *Exoneura* species, on apple blossom. (Photo: Bees Business)

Front cover: European honey bees, *Apis mellifera*. (Photo: Kirrily Hughes)

Contact us or visit our website for more information on school programs.

Email: info@wheenbeefoundation.org.au

WheenBeeFoundation.org.au/schoolprograms

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