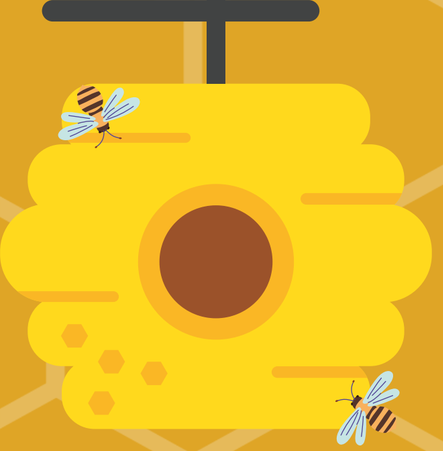
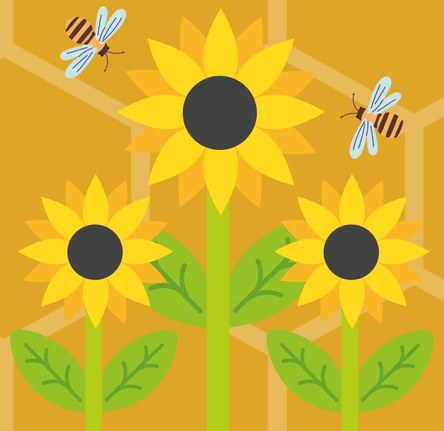


Save the Bees

Addressing Declining Bee Populations

Lucy Rice
Walford Anglican School for Girls



Introduction

Bee populations worldwide are at risk: This significant decline of bees will have dire consequences to our ecosystem and also to all species on the planet.

My presentation explores:

- The importance of bees on biodiversity, food security and the economy
- The state of bees and why are they at risk
- Dangers of bee decline
- What can be done to encourage the preservation and increase the numbers of bees

"Pollinators are what ecologists call keystone species. You know how an arch has a keystone. It's the one stone that keeps the two halves of the arch together. [...] If you remove the keystone, the whole arch collapses"

– May Berenbaum, PhD, Entomologist.
From Silence of the Bees, PBS Nature.

Facts About Bees

Bee Informed

There are approximately 25,000 species of bees worldwide, with approximately 2000 species of native bees in Australia - at least 300 of these in South Australia

Super-Family: Apoidea, with over 4000 genera

8 species of bees are on the endangered list

There can be up to 40,000 bees in one honey bee hive or colony

A colony consists of one queen bee who can lay up to 2,000 eggs per day, thousands of female worker bees who maintain the hive and hundreds of male drone bees who fertilise the eggs of the queen

Honey bees communicate the location and type of food resources through complex movements and chemical signals

Approximately 70% of Australian honey is produced using nectar from native plants. Many plant crops, such as almonds, apples and avocados, solely rely on bee pollination for crop production.

There are approximately 20,000 registered beekeepers across Australia producing approximately 30,000 tonnes of honey each year

Australian honey is consumed in more than 38 countries, including Singapore, Hong Kong, China, Canada, UK and Malaysia

In Australia we have a wide variety of bee species, which can be categorised as either Native and Introduced Bees:

Native Bees

There are approximately 2000 species of native bees in Australia and an estimated 300 species that live in the local Adelaide region.

Native bees are not aggressive and will only sting if provoked. They are prolific pollinators and are an important part of the ecosystem. They lay eggs in 'bee hotels", nesting in narrow holes in wood and mud clay. They do not produce honey and instead are excellent pollinators or food and flowers.

Some Native Bees are social bees meaning they live together. Many are solitary, meaning they prefer to live independently.

Native Bees to Adelaide include: Blue Banded Bees, Green Carpenter Bees, Teddy Bear Bees, Leaf Cutter Bees and Resin Bees.

Introduced Bees

In Australia, a number of bees were introduced from overseas. These bees are refered to as Introduced Bees or "Feral" Bees and include European Honeybees, Asian Honeybees, European Bumblebees, South African Carder Bees and Mediterranean Emerald Furrow Bees.

The European Honeybees were deliberately introduced specifically for honey production and crop pollination. However, the other four have arrived in Australia unintentionally and all have now established feral populations in bushland and natural surroundings.

Honey bees live in colonies with a queen in a hive and are both honey producers and also excellent pollinators of food and flowers. They are critical to the economy. They can be kept in urban areas but need to be registered with PIRSA (Primary Industries and Regions SA) as livestock.

The Importance of Bees

Bees are vital to the health and wellbeing of the planet. They significantly contribute to the following key areas, that without the help of bees, would collapse.

Biodiversity

Biodiversity refers to the variety of all forms of life on the planet and is essential for the healthy functioning of our ecosystem: the stronger biodiversity is, the healthier the ecosystem is.

Bees are considered to be a "keystone species" by playing a vital role in every aspect of the ecosystem. As pollinators, bees support the growth and survival of flowers, vegetables, fruit, trees and other plants, which provide both food and shelter for many other species.

Honey bees also provide significant benefits to native forests. Plant biodiversity contributes to positive outcomes such as soil and water retention, local area cooling and the absorption of carbon dioxide from the Earth's atmosphere.

Without bees there would be no gardens, no food and many species, including humanity would cease to exist. Bees are essential for environmental sustainability and survival.

Food Security

The United Nations' Committee on World Food Security, has defined Food Security to mean that "all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their food preferences and dietary needs for an active and healthy life".

Bees don't just make honey, through pollination they provide for a wide variety of fruits and vegetables, nuts, seeds and grains. They pollinate billions of plants each year, including wild plants and agricultural crops. It is estimated that two thirds of Australia's agriculture benefits from honey bee pollination. In fact, approximately a third of everything you eat is pollinated by bees.

Their honey is also a nutritious food source for many animals, birds and other insects and bees themselves are a food source for birds, insects and spiders.

Other Products

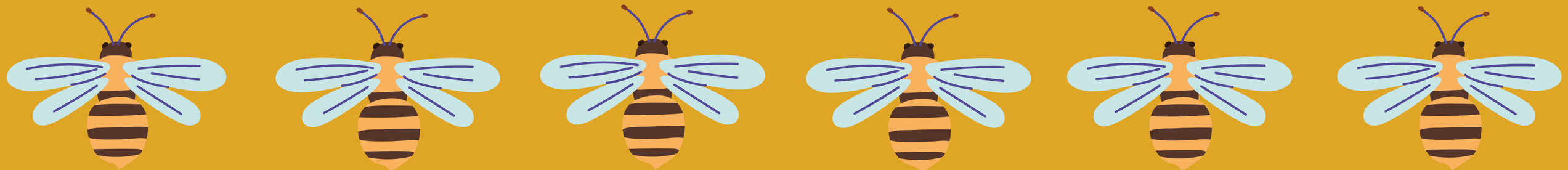
Bees also are a valued provider for a number of other products including beeswax which is used in cleaning and beauty products, pollination of cotton used to make clothing and other items and flax which is also used to make fabric and fibre as well as other household products.

Bee products have also been long considered to have medicinal qualities including anti-inflammatory, anti-bacterial, anti-fungal, anti-viral and antioxidant. Honey, bee pollen, propolis, royal jelly, beeswax, and bee venom have all been used to bring relief from wounds, burns, arthritis, treatment of chronic ulcers and inflammation. Honey also boosts the immune system and recent studies are exploring the positive effects on a number of cancers.

The Economy

Beekeeping is considered to be a unique primary industy and the contribution of pollinators to agriculture is so vast that it is difficult to quantify an exact economic value. Almost 90% of wild plant species and over 75% of crops we use for food depend on pollination.

Worldwide, it is estimated that the economic value of pollinators is S235-577 billion annually. In Australia, the honey bee industry's estimated gross value is approximately AUS99 million, with the value of honey bee-reliant agriculture estimated at AUD S4–6 billion per year.



Bees At Risk

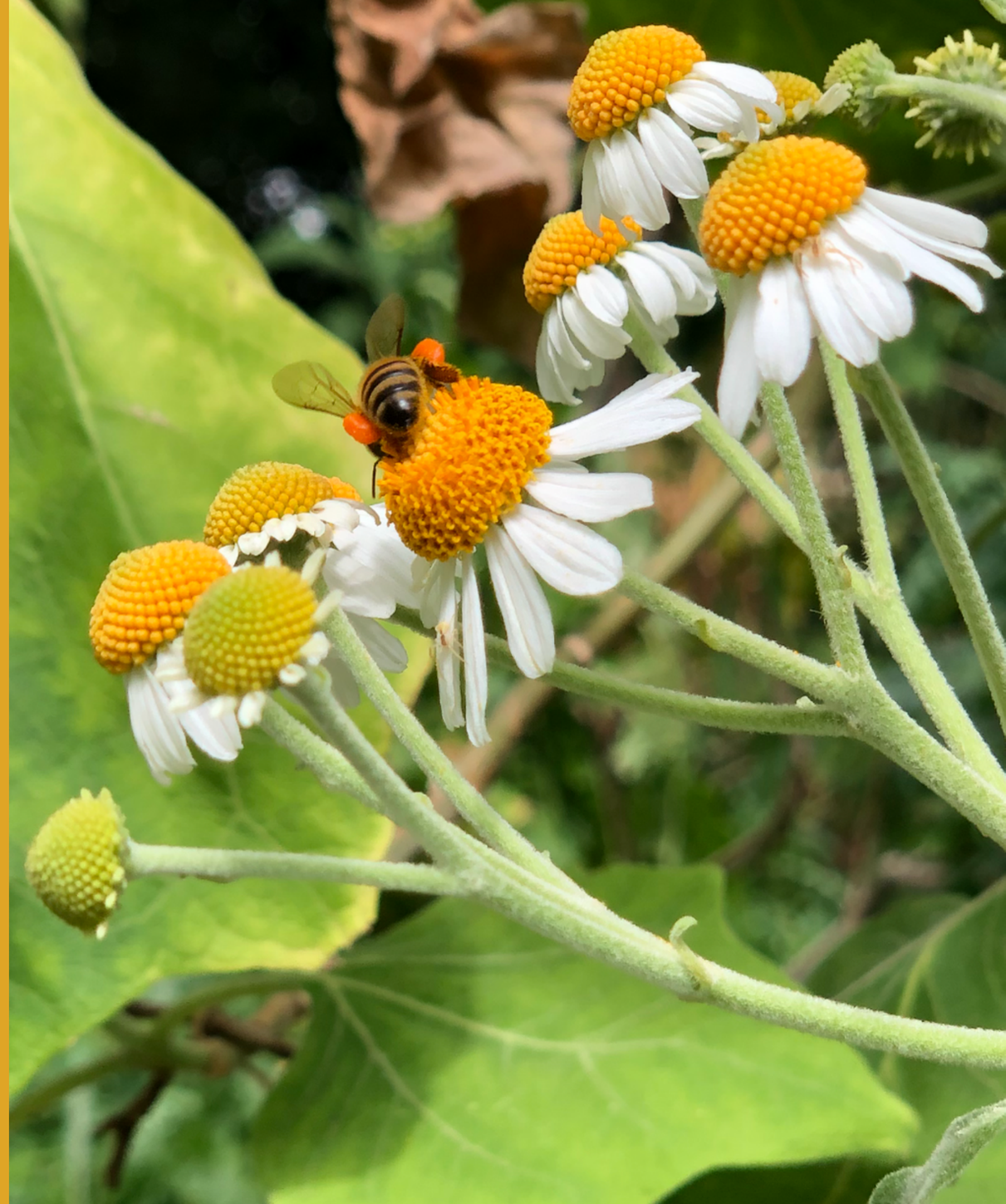
The Decline of Bees

An alarming decline of bees is being reported worldwide, with the United States, South America and Europe indicating mass bee deaths since 2006.

In the absence of any singular explanation, the disturbing mass reduction was referred to as 'Colony Collapse Disorder'.

As at March 2020, it is reported that 8 bee species are now on the brink of extinction. While honey bees and many native bees are not yet in peril, their numbers are significantly declining rapidly: it is estimated their populations have fallen by 40% - 50%.

It is believed that the extinction of bees, would have catastrophic effects on the Earth and may bring the end of humanity.



Bees have been dying over the last 50 years, from multiple and interacting causes. The reduction of population and smaller colonies of bees results in limited genetic diversity which means bees are less able to adapt and fight disease. The following factors are significant contributors of putting bees at risk:

Flowerless Landscapes

Declining bee populations can be directly linked to a reduction in biodiversity including the decrease of both native and urban habitat.

Bees feed on pollen and honey (nectar), which they collect from flowering plants, with any surplus stored in comb cells for when their food is scarce or insufficient to support the colony.

Flowerless landscapes mean that there is not enough food for bees and they die of starvation. Flowerless landscapes are caused by land-clearing for urban encroachment (to accommodate housing), a reduction in both native wildflowers and gardens with flowering plants, opting for hard surfaces and/or lawn and deforestation.

Monoculture

Changes in farming and agricultural practices are resulting in less variety of flowering crops and replacing them with single crop species planted on mass such as corn, canola and soy beans - this is called "monoculture". However bees need crop diversity to thrive and without this variety:

- Bees become malnourished from only having one type of pollen as a food source
- Bees can starve as certain crops only have a short bloom time leading to periods of loss of pollen which bees feed on, with some crops not even producing nectar or pollen.
- Bees immune systems can be depleted on a monoculture diet resulting in a reduced lifespan and decline in population diet

Pesticides/Insecticides

Chemical pesticides are regularly used to eliminate insect pests - but these pesticides do not discriminate between insects: they also kill the beneficial and indispensable ones, including honey and native bees.

In monoculture practices, insecticide (commonly neonicotinoid) is coated on the seeds before planting and when the plants germinate and grow, the insecticide becomes part of the plant and pollen. When bees gather this treated pollen, they are exposed to the insecticide chemical and when they bring the pollen back to the hive, the whole colony is exposed as well. Insecticide is also sprayed on crops to reduce the damage by harmful insects, but this also kills bees which are vital for crop pollination.

Even a non-lethal exposure to chemical pesticides can have serious effects on bees immune systems, memory and navigational skills. They are unable to find their way back to their hives, to their food source or to water. Regular exposure to pesticides can cause bee mortality and colony collapse.

Herbicides & Fertilisers

Like insecticides, herbicides such as glyphosate, are used to control and eradicate weeds. Studies have shown this is extremely harmful to pollinators, because when they come into contact with herbicide, the chemical acts like an overdose of antibiotics which reduces bees gut health, leaving them vulnerable to disease and causes premature death.

Also chemical based synthetic fertilizers and some organic fertilizers that contain high levels of copper sulfate , are used for promoting plant growth and encouraging prolific flowering and fruiting. But these are also lethal to bees. It is more beneficial to use organic composts and plant material as bee friendly alteratives.

Parasites & Diseases

There are a number of pests and diseases that pose a serious threat to both native and honey bees and are a key reason for the significant decline in pollinators.

In Australia, parasites such as Small Hive Beetles, Braula Fly and Wax Moths can cause damage to honey bee colonies, including to the brood, the honeycomb, honey and pollen.

The greatest disease to Australian honey bees is a disease called American Foulbrood, which is caused by a bacteria where the bee larvae turn to slime.

Australia is the only continent currently free from the Varroa mite. We have proactive bio-security measures in place to manage the threat of the introduction of the Varroa mite, which has been identified as a primary source of bee deaths globally.

These parasites, cause large scale destruction to bee colonies. They infiltrate and feed off bee larvae and then infest the colony by latching onto bees, sinking in their fangs and drinking the bees dry of blood. It's imperative we continue to manage this risk as introduction of Varroa mite will have dire consequences on our bee populations.

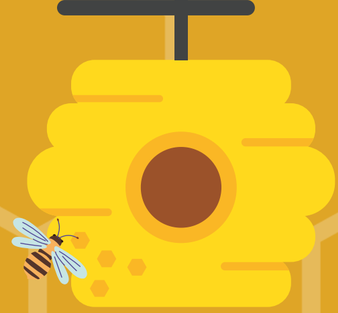
Climate Change

Climate change is impacting bee populations due to the disruption of timing that flowers bloom and the timing which bees pollinate. Warmer weather means the cycles between bees and plants are out of sync: flowers are blooming earlier in the growing season due to rising temperatures, before many bees pollinate the plants. So, when bees begin pollination there is limited nectar available and competition for these valuable resources becomes more intense.

Also climate change has lead to an increase in natural disasters like droughts and bush fires which destroy bees shelters, kill the plants and flowers required for the bees to survive and wipe out generations of bee colonies.

Interventions to Save the Bees

Bee sustainability is everyone's responsibility: we don't need to wait for others to act. There are a number of simple actions individuals can take to ensure the preservation and survival of our native and honey bee populations.



Plant a Bee Friendly Garden

Planting a variety of flowering plants, herbs and trees will attract bees and provide them with ample sources of food all year round, as well as with shelter. Flowers can be grown in garden beds or simply in pots and planters if you do not have the space.

There are many guides online to assist selecting the suitable plants to sustain local bees. As a general rule, select a diverse variety of shapes, colours and flowering times.

Avoid Pesticides and Herbicides

Refrain from using pesticides, fungicides or herbicides on your garden Plants get contaminated and the product will likely reach the bees and kill them. If possible, ensure the plants you buy are not pre-treated. Also, when feeding your garden, opt for compost and plant based fertilisers that will not harm bees.

Buy Honey from Local Beekeepers

Buy local and raw honey from your local beekeepers. Avoid honey sold in bulk or in the supermarket unless you are sure of its origin and quality. Farmers markets are great places to start., and the honey sourced by them is usually more delicious and can also taste like the flowers they grow.

Provide Drinking Water

Provide a small dish or shallow bowl of fresh water for the bees to drink during summer. Include a few stones and floating cork on the water so bees don't drown.

Be Aware and Become a Bee Champion

Educate yourself and your family and friends about bees. Bees are not predators and do not willfully attack humans. By becoming more informed about bees and better understanding them, we will learn to respect and protect them - happily co-existing and benefiting from one another. If you are really keen, you can install an insect hotel or learn how to become a beekeeper, providing a hive in your garden and farm your own delicious honey!

"If the bee disappeared off the surface of the globe, then man would have only four years of life left. No more bees, no more pollination, no more plants, no more animals, no more man"

– Albert Einstein
(attributed to)

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