



Food and Agriculture
Organization of the
United Nations



YUNGA LEARNING
AND ACTION SERIES
Challenge badge 12

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Pollinators Challenge Badge



APIMONDIA :: CBD :: CGRFA :: CZS :: FAO :: GOVERNMENT OF SLOVENIA
ICYB :: SBA :: UNESCO :: WAGGGS :: WOSM

This booklet is intended as a guide for teachers and youth leaders. These individuals are responsible for the development of programmes and activities that are suitable for their group and for ensuring the required supervision and safety provisions so that all participants are safe and sound.

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The YUNGA Challenge Badges are developed to support the achievement of the Sustainable Development Goals (SDGs).



This challenge badge is in support of World Bee Day 20 May www.worldbeeday.org/en



This product contributes to the Education for Sustainable Development for 2030 (ESD for 2030) framework of UNESCO.



Pollinators Challenge Badge

Developed in collaboration with



Convention on
Biological Diversity



Food and Agriculture
Organization of the
United Nations

COMMISSION ON
GENETIC RESOURCES
FOR FOOD AND
AGRICULTURE



Food and Agriculture
Organization of the
United Nations



REPUBLIC OF SLOVENIA
GOVERNMENT OF THE REPUBLIC OF SLOVENIA



International Centre
for Young Beekeepers



WORLD ASSOCIATION
OF GIRL GUIDES
AND GIRL SCOUTS



The World Organization of the Scout Movement (WOSM) and the World Association of Girl Guides and Girl Scouts (WAGGGS) endorse this educational badge framework for use by Guides and Scouts around the world, adapting it as necessary to their local needs and requirements.

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BE

SAFE AND SOUND!

DEAR LEADER OR TEACHER,

The Challenge Badges are designed to support you in undertaking educational activities. However, as you will be implementing these activities in different contexts and environments, you should ensure that the activities you choose are appropriate and safe.

Exploring the great outdoors is a fantastic way to learn about the natural world; nevertheless, it is important to take some precautions to ensure nobody gets hurt. Please plan carefully and make sure you have enough adult supervision to keep participants safe. Young children should be supervised by an adult at all times.



SOME GENERAL PRECAUTIONS TO CONSIDER

- * Wash your hands after every activity.
- * Be aware of which flowers, plants and berries in your area are poisonous and make sure participants avoid these.
- * Don't attempt to taste things you find unless you are certain they are not poisonous.
- * Don't drink water from natural sources unless you are sure it is safe.
- * Be particularly careful when you are near water, streams, rivers and lakes.
- * Be careful when using sharp objects and electrical appliances.
- * For any activities requiring proximity to stinging insects such as bees or wasps, take precautions to avoid getting stung. Don't wear sweet-smelling lotion or perfume or flowery or colourful clothes. Do wear long sleeves and long trousers. If you have long hair, pull it back into a ponytail or braid. Keep your movements slow and calm around our pollinating friends. Young children must be supervised by an adult at all times.
- * For any activities requiring proximity to pollen, participants with pollen allergies should exercise the necessary precautions with parental approval, e.g. through medication or wearing masks.
- * In some activities, you have the option of uploading pictures or videos to the Internet on websites such as YouTube. Always make sure that everyone in the pictures or video, and/or their parents, have given their permission to use the website and be in the media before you post anything online.

DEALING WITH INSECT STINGS

If someone is stung by an insect, it's important to act quickly. You should call emergency services if the person who has been stung shows symptoms like severe swelling of the throat, lips or face, or abnormal swelling at the site of the sting, itching in areas of the body not affected by the sting, breathing trouble, loss of consciousness, weak or very quick pulse, dizziness or blue lips. Otherwise, here are a few immediate first-aid steps you can take:

- * Remove the sting, tick or hairs if still in the skin with forceps.
- * Wash the affected area with soap and water.
- * Apply a cold compress (such as a flannel or cloth cooled with cold water) or an ice pack to any swelling for at least 10 minutes. Use a towel. Don't put ice directly on the skin and don't use heat.
- * Raise or elevate the affected area if possible, as this can help reduce swelling.
- * Avoid scratching the area or bursting any blisters, to reduce the risk of infection – if your child has been bitten or stung, it may help to keep their fingernails short and clean.
- * Avoid traditional home remedies, such as vinegar and bicarbonate of soda, as they're unlikely to help.

Source: National Health Service – NHS UK

LOOK AFTER THE NATURAL WORLD

- * Treat nature with respect.
- * Do not increase waste.
- * It is better to leave nature as you found it. Never pick protected species. Before collecting plants or picking flowers, get permission. Only take what you really need and make sure you leave at least two-thirds of anything you find in the wild.
- * Be careful if you are working with animals or insects. Wear protection if necessary. Be gentle. Make sure they have appropriate food, water, shelter and air. When you're done, return them to where you found them.
- * Recycle or reuse the materials used in the activities as much as possible.



SUSTAINABLE DEVELOPMENT GOALS

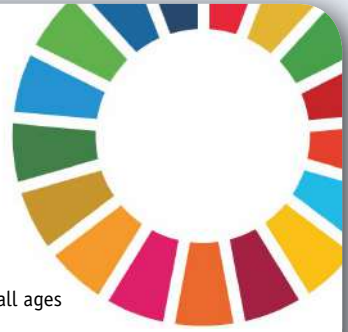
On 25 September 2015, the United Nations General Assembly unanimously adopted the resolution: **Transforming our World: the 2030 Agenda for Sustainable Development**. This historic document lays out the 17 Sustainable Development Goals (SDGs) to be achieved by the year 2030. The SDGs aim to mobilize global efforts to end poverty, foster peace, safeguard the rights and dignity of all people, and protect the planet, to ensure a sustainable future for all.

The Youth and United Nations Global Alliance (YUNGA) actively supports the achievement of the SDGs through the development of initiatives, activities and resources such as the United Nations Challenge Badges and by promoting and encouraging young people to be active citizens in their communities. Additional Challenge Badges are being developed to further support the SDGs.

thegoals.org is an online platform connecting youth groups all over the world to tackle the SDGs in a fun, interactive way. Available on any Internet-enabled device and aimed at young people who want to learn about the SDGs and take action. Visit: <http://waggs.thegoals.org>



THERE ARE 17 SDGs:



1 – NO POVERTY
End poverty in all its forms everywhere



2 – ZERO HUNGER
End hunger, achieve food security and improved nutrition



3 – GOOD HEALTH AND WELL-BEING
Ensure healthy lives and promote well-being for all at all ages



4 – QUALITY EDUCATION
Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all



5 – GENDER EQUALITY
Achieve gender equality and empower all women and girls



6 – CLEAN WATER AND SANITATION
Ensure availability and sustainable management of water and sanitation for all



7 – AFFORDABLE AND CLEAN ENERGY
Ensure access to affordable, reliable, sustainable and modern energy for all



8 – DECENT WORK AND ECONOMIC GROWTH
Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all



9 – INDUSTRY, INNOVATION AND INFRASTRUCTURE
Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation



10 – REDUCED INEQUALITIES
Reduce inequality within and among countries



11 – SUSTAINABLE CITIES AND COMMUNITIES
Make cities and human settlements inclusive, safe, resilient and sustainable



12 – RESPONSIBLE CONSUMPTION AND PRODUCTION
Ensure sustainable consumption and production patterns



13 – CLIMATE ACTION
Take urgent action to combat climate change and its impacts



14 – LIFE BELOW WATER
Conserve and sustainably use the oceans, seas and marine resources for sustainable development



15 – LIFE ON LAND
Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss



16 – PEACE, JUSTICE AND STRONG INSTITUTIONS
Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels



17 – PARTNERSHIPS FOR GOALS
Strengthen the means of implementation and revitalize global partnership for sustainable development

GOALS 1, 2 AND 15

As we will learn in this badge, pollinators also have an important role in achieving many of the other SDGs.

GOAL 1

No Poverty

End poverty in all its forms everywhere.



Specific targets

- 1.1** By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than USD 1.25 a day.

Where do pollinators come in?

Seventy-five percent of the world's major fruit and seeds depend on pollination to some extent but pollinators are under threat. Their decline will affect the economy, jobs and incomes of millions of people, such as farmers and beekeepers.

GOAL 2

Zero Hunger

End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.



Specific targets

- 2.1** By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round.
- 2.4** By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality.
- 2.A.** Increase investment, including through **enhanced international cooperation**, in rural infrastructure, agricultural research and extension services, technology development and plant and livestock gene banks in order to enhance agricultural productive capacity in developing countries, in particular least developed countries.

Where do pollinators come in?

Improving pollinator abundance and diversity improves the quality and quantity of crops and thus promotes food security and healthy nutrition.

GOAL 15

Life on Land

Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.



Specific targets

- 15.1** By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements.
- 15.5** Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species.
- 15.9** By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts.

Where do pollinators come in?

Pollinator loss will harm many ecosystems as around 90 percent of angiosperms (flowering plants) depend on animal pollination. Pollinators help maintain a diversity of plants, as well as the animals that feed on those plants.

Score a GOAL where you live!

Why don't you explore with your group which "targets" you could help your local community achieve? Find out more about the Sustainable Development Goals at:

www.fao.org/yunga/global-citizens/sdgs/en
<https://sustainabledevelopment.un.org/topics>

If you have access to a smartphone, you could then create and record your actions using the SDGs in action app:

<https://sdgsinaction.com>



THE

CHALLENGE BADGE SERIES

Developed in collaboration with United Nations agencies, civil society and other organizations, the YUNGA Challenge Badges are intended to raise awareness, educate and motivate young people to change their behaviour and be active agents of change in their local communities. The Challenge Badge series can be used by teachers in school classes as well as by youth leaders, especially Guide or Scout groups.

To see existing badges, go to www.fao.org/yunga/resources/en

To receive updates on new releases and other YUNGA news, register for the free YUNGA newsletter by emailing yunga@fao.org



YUNGA has or is currently developing badges on the following topics:

AGRICULTURE: How can we produce and consume food and other products in a sustainable way?

BIODIVERSITY: Let's make sure no more of the world's glorious animals and plants disappear!

CLIMATE CHANGE: Join forces to help mitigate climate change for a secure future!

DISASTER RISK REDUCTION: Know the dangers in your natural environment and reduce them.

ENERGY: The world needs a healthy environment as well as energy – how can we have both?

FORESTS: Forests provide homes for millions of species, help regulate the atmosphere and provide us with essential resources. Let's protect them!

GENDER: What actions can be taken to ensure a more equal and fair world for everyone, in particular girls and women?

GOVERNANCE: Discover how decision-making can affect your rights and equality among people around the world.

HUNGER: Having enough to eat is a basic human right. What can we do to help the 1 billion people who still go hungry every day?

NUTRITION: What is a healthy diet and how can we make food choices that are environmentally friendly?

POLLINATORS: Learn how they feed humanity and ensure the sustainability of our planet.

THE OCEAN: The ocean is mesmerizing and amazing. It helps regulate temperatures on Earth, provides us with resources and much, much more.

TIDE TURNERS: Creating a world without plastic waste.

SOILS: Soil is the foundation of habitats, allows us to grow our food and helps control erosion, filters our water and regulates greenhouse gases. How do we take care of the ground under our feet?

WATER: Water is life. What can we do to safeguard this precious resource?



CREATING BEHAVIOUR CHANGE

We work with young people because we want to support them in leading fulfilling lives, help them prepare for their future, and for them to believe that they can make a difference in the world. The best way to make this difference is by encouraging young people to embrace long-term behaviour change. Many current social and environmental problems are caused by unhealthy or unsustainable human behaviour. Most people need to adapt their behaviour, and not just for the duration of a project such as working on this Badge, but for life. Young people know more about these issues than ever before, but still behave in detrimental ways. It is clear that simply raising awareness is not enough to change behaviour.

Steps you can take to make long-term impacts

There are some proven ways of promoting behaviour change so, to increase the long-term impact of this Challenge Badge, try to do the following:



FOCUS ON SPECIFIC, ACHIEVABLE BEHAVIOURAL CHANGE

Prioritize activities that target very clear and specific behaviour change (e.g. stop using products that cause air pollution) and break the actions into small steps and work through them with the group.



ENCOURAGE ACTION PLANNING AND EMPOWERMENT Put young people in charge: let them choose their own goals (that are closest to their heart) and plan how to carry them out.



CHALLENGE CURRENT BEHAVIOUR AND TACKLE BARRIERS TO ACTION

Encourage participants to scrutinize their current behaviour and think about how it could be changed. Everyone has excuses for why they don't behave in a particular way – lack of time, lack of money, not knowing what to do... the list goes on. Encourage young people to voice these reasons and then find ways around them.



PRACTISE ACTION SKILLS AND FORM NEW GOOD HABITS

You'd like to make your garden friendlier to birds, bees and other pollinators in the area? Find which plant species are native to

your local environment or region and plant them in your garden – let's avoid invasive non-native species. The more diversity the better! You'd like to reduce your carbon footprint in order to help pollinators? Try walking or biking to school instead of taking a car. Keep practising until it becomes a habit for at least 21 days. This is because it is much easier to adopt a new good habit than give up an old bad one.



SPEND TIME OUTDOORS No one is going to look after something they don't care about. Time spent in natural environments – whether that is the local park or a pristine wilderness – encourages an emotional connection with the natural world that is proven to lead to more pro-environmental behaviour.



GET FAMILIES AND COMMUNITIES INVOLVED Why change the behaviour of just one young person when you could change the behaviour of their entire family, or even the whole community? Spread your message more widely: showcase what you have been doing for the local community and encourage young people to get their family or friends to join in. For an even bigger impact, get political and lobby your local or national government.



MAKE A PUBLIC COMMITMENT People are far more likely to do something if they agree to do it in front of witnesses or in a written statement – why not take advantage of this?



MONITOR CHANGE AND CELEBRATE SUCCESS Behaviour change is hard work! However you can make it a fun competition! Revisit tasks regularly with your peers to monitor and compare achievements and reward continued success in an appropriate way.



LEAD BY EXAMPLE The young people you work with look up to you. They respect you, care about what you think and want to make you proud. If you want them to embrace the behaviour you are advocating, then you must lead by example and make those changes yourself.

And never doubt –

YOU CAN MAKE A DIFFERENCE!



TIPS ON

UNDERTAKING THE BADGE WITH YOUR GROUP

In addition to the suggestions above encouraging behavioural change, the following ideas are intended to help you develop a programme to undertake the Challenge Badge with your group.

STEP 1

Encourage your group to learn about pollinators and how their existence is crucial for achieving several of the SDGs. You may find the background information is useful for this. Start by raising participants' awareness about which animal species, in particular insects, are pollinators and about how pollination works. Make sure they understand that pollinators face multiple risks and that their decline jeopardizes the majority of the world's flowering plants, which include crops and the food we eat. Explore together which pollinators you have in your location and what kind of impacts they suffer. Then discuss with the group how all of us can help protect pollinators for the benefit of both people and the planet.

STEP 2

Apart from the compulsory activities, which ensure that participants understand basic concepts and issues related to pollinators, participants are encouraged to select the activities that best match their needs, interests and culture. As far as possible, let the participants choose which activities they want to do. Some activities can be done individually, others in small groups. If you have another activity that is especially appropriate for your group or area, you may also include it as an additional option.

STEP 3

Allow enough time for the group to carry out the activities. Support and guide them through the process but make sure they carry out their tasks as independently as possible. Many activities can be conducted in several different ways. Encourage participants to think and act creatively when undertaking their activities.

STEP 4

Have participants observe, measure and compare among themselves the results of their Challenge Badge activities. Let them present these results to the rest of the group. Do you notice any changes in their attitudes and behaviour? Encourage participants to think about how their daily activities can help protect pollinators. Discuss the experience and reflect on how they can continue to apply it in their lives.

STEP 5

Organize a celebration for those who successfully complete the Badge curriculum. Invite families, friends, teachers, journalists and community leaders to participate in the celebration. For example, you could organize an event for World Bee Day, observed each year on 20 May. Encourage your group to present the results of their project to the community in a creative way. Award them with certificates and Challenge Badges (see page 160 for details).

STEP 6 SHARE WITH YUNGA!

Send us your stories, photos, drawings, ideas and suggestions. We are always delighted to hear how you have been using these Challenge Badges and we always want to improve our resources, so contact us at: yunga@fao.org or even better share your actions on twitter [@UN_YUNGA](https://twitter.com/UN_YUNGA), Facebook www.facebook.com/yunga.un, Instagram www.instagram.com/un_yunga/ and tiktok.com/@unyunga

INTRODUCTION TO THE POLLINATORS CHALLENGE BADGE

The Pollinators Challenge Badge is designed to help educate children and young people about the important role pollinators play in our food systems and the environment.



This booklet includes **basic background information** on pollinators. It explains which species are pollinators and how pollination works. It explains the key role of pollinators in the food we eat and benefits to the environment. It also highlights the main factors that are putting pollinators at risk, such as the use of pesticides, land management, pests and diseases, and the impacts of climate change. The Badge then provides tangible ideas for how we can all help nurture and protect pollinators for the benefit of all.

Naturally, some of this material will be more appropriate for certain ages than others. Leaders should select the topics and level of detail most appropriate for their group. For example, you may wish to skip the more complicated issues with younger groups, but you will probably wish to conduct further research beyond the Badge with older groups.

The second part of the booklet (**Badge Curriculum**) contains a range of activities and ideas to stimulate learning and motivate children and young people to engage in safeguarding pollinators.

Additional resources, useful websites and a glossary explaining key terms (that are highlighted in the text like **this**) are provided at the end of the booklet.

BADGE CONTENT AND CURRICULUM

This booklet is designed to help you develop an educational programme for your class or group on the importance of pollinators. However, teachers and youth leaders should use their own judgement to develop and tailor an appropriate curriculum for their group. This could incorporate additional activities not listed in this booklet, but that allow you to achieve all the educational requirements. Remember the key objective of the Challenge Badge is to educate, inspire and most of all motivate action and behaviour change.



Badge Structure

The background information (pp. 28–105) and the activities (pp. 106–118) are divided into four main sections:

- A. WHAT IS A POLLINATOR?:** an introduction to which species comprise pollinators and how they pollinate
- B. WHY POLLINATORS ARE IMPORTANT?:** how pollinators benefit people and the environment
- C. BEE CONCERNED:** the threats facing pollinators
- D. TAKE ACTION:** how all of us can help protect pollinators

Requirements: To earn the Badge, participants must complete one of the two compulsory activities presented at the beginning of each section, plus (at least) one additional activity from each section, chosen individually or as a group (see graphic on page 20). Participants can also complete additional activities considered appropriate by the teacher or leader.

Section A: WHAT IS A POLLINATOR?

1 compulsory activity (A.1 or A.2) & at least 1 optional activity (A.3 - A.10)

+

Section B: WHY ARE POLLINATORS SO IMPORTANT?

1 compulsory activity (B.1 or B.2) & at least 1 optional activity (B.3 - B.10)

+

Section C: BEE CONCERNED

1 compulsory activity (C.1 or C.2) & at least 1 optional activity (C.3 - C.10)

+

Section D: TAKE ACTION

1 compulsory activity (D.1 or D.2) & at least 1 optional activity (D.3 - D.11)

=


**Pollinators Challenge Badge
COMPLETED!**

Age ranges of activities

To help you and your group select the most appropriate activities, a coding system is provided to indicate the age group(s) for which each activity is most suitable. Next to each activity, a code (for example “Levels ① and ②”) indicates that the activity should be suitable for five to ten-years-olds and 11 to 15-years-olds. Please note that this coding is only indicative. You may find that an activity listed at one level is suitable for another age group in your particular location.

- L
E
V
E
L**
- ① Five to ten-years-old
 - ② 11 to 15-years-old
 - ③ 16 to 20-years-old

REMEMBER!



In addition to learning and skills-building, the Badge activities should be **FUN**. Encourage participants to enjoy the process of earning the Badge and have fun while learning about pollinators and their importance. The ultimate objectives of the Badge are to build an understanding and appreciation of pollinators, and to motivate individuals to change their behaviour and create local and international action aimed at protecting pollinators.

SAMPLE BADGE CURRICULA

The sample curricula for the different age groups below provide examples of how the Badge could be earned and are intended to help you in developing your own programme. Please note that the activities suggested below are just examples; you may build your own curriculum in keeping with local concerns in your country or region. However, all groups should complete the core activities marked as compulsory in the **BADGE CURRICULUM**.

LEVEL

1

Five to ten-years-old

2





11 to 15-years-old

3

16 to 20-years-old

Each activity has a specific learning aim, but in addition to this, children will have the opportunity to learn more general skills including:

- * **TEAMWORK**
- * **IMAGINATION AND CREATIVITY**
- * **OBSERVATION SKILLS**
- * **AN INTEREST IN SCIENCE, THE EARTH AND PHYSICAL PROCESSES**
- * **CULTURAL AND ENVIRONMENTAL AWARENESS**
- * **NUMERICAL AND LITERACY SKILLS**

SECTION	ACTIVITY	LEARNING OBJECTIVES
A What is a pollinator? 	A.2: Build a bee hotel (p. 137)	To help protect and encourage observation of pollinators To learn how pollination works
	A.6: Bee farm visit (p. 139)	
B Why are pollinators important? 	B.1: Favourite fruits and vegetables (p. 143)	To understand the importance of pollinators to the planet, people and the food we eat
	B.5: Local landscape (p. 144)	To start to build empathy for pollinators in our ecosystem
C Bee concerned 	C.2: Field trip (p. 147)	To understand the threats to pollinators and why this matters To understand the role we all play in protecting pollinators and the steps we can take
	C.4: Habitats in the wild (p. 148)	To understand that we all live in the same world, and together, we need to protect it and keep it clean
D Take action 	D.2: Give bees a chance (p. 153)	To help your local pollinators find nectar and pollen
	D.3: Being good for global good (p. 154)	To motivate positive behaviour change

LEVEL

1

Five to ten-years-old

2




11 to 15-years-old

3

16 to 20-years-old

As in Level 1, each activity in Level 2 has a specific learning aim, but also fosters additional, more general skills including:

- * **TEAMWORK AND INDEPENDENT STUDY SKILLS**
- * **IMAGINATION AND CREATIVITY**
- * **OBSERVATION SKILLS**
- * **AN INTEREST IN SCIENCE, THE EARTH AND PHYSICAL PROCESSES**
- * **CULTURAL AND ENVIRONMENTAL AWARENESS**
- * **RESEARCH SKILLS**
- * **PRESENTATION AND PUBLIC SPEAKING SKILLS**
- * **THE ABILITY TO PRESENT AN ARGUMENT AND DEBATE**

SECTION	ACTIVITY	LEARNING OBJECTIVES
A What is a pollinator? 	A.1: Pollinator survey (p. 137)	To learn which species are pollinators To encourage team work and build knowledge on pollinators
	A.5: Who's a pollinator? (p. 139)	
B Why are pollinators important? 	B.2: SDG helpers (p. 143)	To research complex issues and place them in context To start to connect our actions to the situation of pollinators
	B.7: Stuff we use (p. 145)	
C Bee concerned 	C.2: Field trip (p. 147)	To understand the threats to pollinators and why this matters To understand the role pollinators play in conserving the planet
	C.5: Painting the big picture (p. 149)	To understand that we all live in the same world and we need to protect it and keep it clean together
D Take action 	D.1: Create a buzz (p. 153)	To foster activism and change in lifestyles to help preserve pollinators To improve observation and understanding of pollinators
	D.5: Park signs (p. 155)	To collaborate with other groups of citizens towards achieving a common goal

LEVEL

1

Five to ten-years-old

2





11 to 15-years-old

3

16 to 20-years-old

The general skills a Level 3 curriculum seeks to develop include:

- * **TEAMWORK AND INDEPENDENT STUDY SKILLS**
- * **IMAGINATION AND CREATIVITY**
- * **OBSERVATION SKILLS**
- * **AN INTEREST IN SCIENCE, THE EARTH AND PHYSICAL PROCESSES**
- * **CULTURAL AND ENVIRONMENTAL AWARENESS**
- * **TECHNICAL SKILLS AND THE ABILITY TO RESEARCH COMPLEX ISSUES**
- * **PRESENTATION AND PUBLIC SPEAKING SKILLS**
- * **THE ABILITY TO PRESENT AN ARGUMENT AND DEBATE**

SECTION	ACTIVITY	LEARNING OBJECTIVES
A What is a pollinator? 	A.1: Pollinator survey (p. 137)	To learn which species are pollinators To build knowledge on native species
	A.9: Evolutionary study (p. 140)	To understand the logic of pollination/fertilization of plants
B Why are pollinators important? 	B.2: SDG helpers (p. 143)	To research complex issues and place them in context To build research skills and learn about products that come from pollinators
	B.8: Bee products (p. 145)	
C Bee concerned 	C.2: Field trip (p. 147)	To understand the threats to pollinators and why this matters To understand the how pollinators help fight hunger and the steps we can take to protect them
	C.6: What about the climate? (p. 149)	To understand that we all live in the same world and we need to protect it and keep it clean together
D Take action 	D.1: Create a buzz (p. 153)	To foster activism and change in lifestyles to help preserve pollinators To increase awareness on the protection of pollinators
	D.7: Local forces (p. 156)	To collaborate with other groups of citizens towards achieving a common goal

BACKGROUND INFORMATION

The following section provides an overview of pollinators and their importance for the planet. It is intended to help teachers and youth leaders prepare their sessions and group activities without having to search for the information. Naturally, not all the materials will be required for all age groups and activities.

Equally, you may find that you need additional information or resources for the older participants. You may want to allow older children to read the material themselves, so longer sections are subdivided into 'factsheets' that can be photocopied easily.

A WHAT IS A POLLINATOR?

A.1: One of our planet's superheroes

A.2: Who's pollinating?



B WHY ARE POLLINATORS IMPORTANT?

B.1: Our best friend

B.2: Pollinators and the SDGs



C BEE CONCERNED

C.1: Pollinators are in trouble

C.2: Life without pollinators



D TAKE ACTION

D.1: Protecting pollinators around the world

D.2: You can make a difference



BACKGROUND INFORMATION



A

WHAT IS A POLLINATOR?



IMPORTANCE

B

CONCERN

C

ACTION

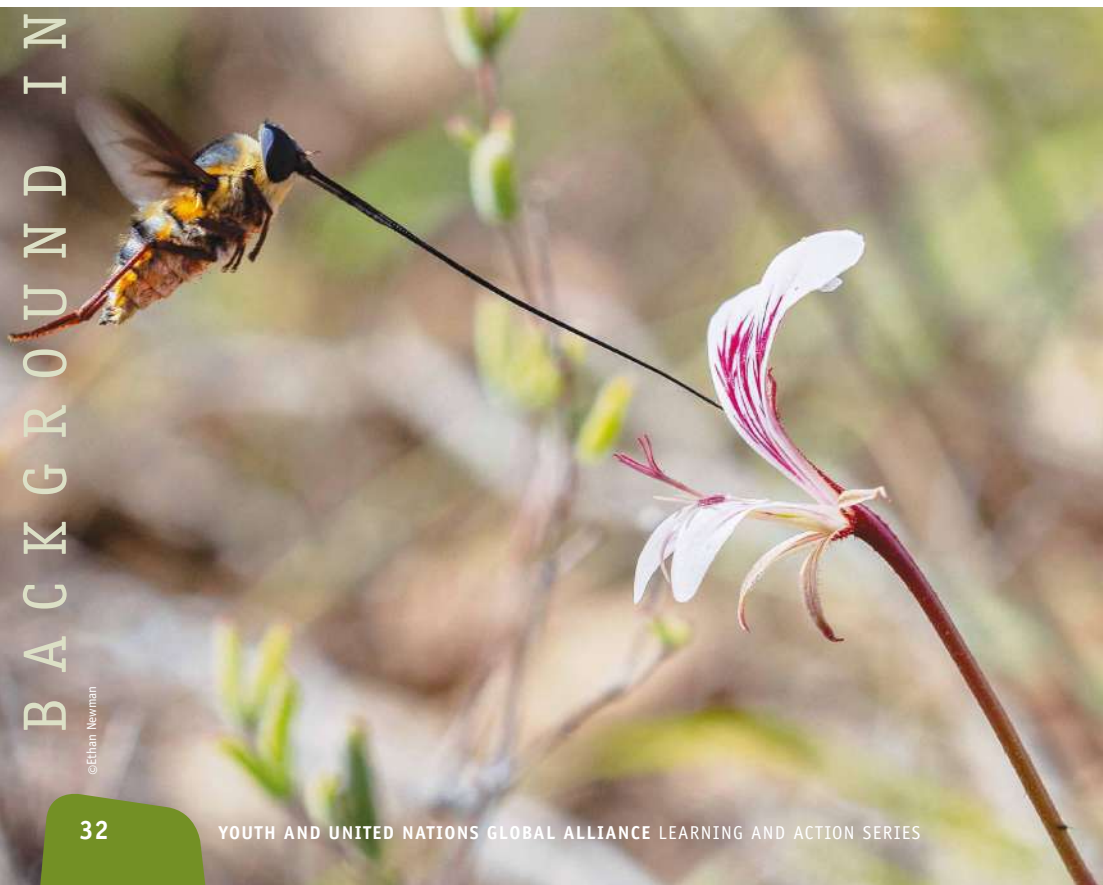
D



A.1 ONE OF OUR PLANET'S SUPERHEROES

When we think of the Earth's most precious natural resources, chances are most of us will think of food, water, forests or energy. However, there is another super resource that perhaps many of us do not think of: **pollinators!**

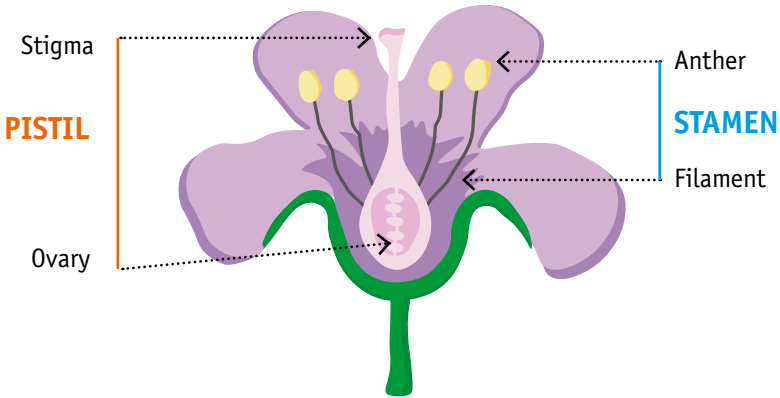
Pollinators? The ones who spread **pollen** around? That sounds like a cool job but how is it so very important? That's what we're going to find out in this Badge. However, first let us find out what pollen and **pollination** are.



©Ethan Newman

A

Pollen is a fine, powdery, generally yellow-orange coloured substance that contains ½ the genetic code to produce new plants and is produced in structures called **stamens** in the flowers. Flowers are more than just pretty faces. By making seeds, they are the tool that plants use to reproduce. In order to create seeds, pollen must be transferred from the male part of a flower (**stamen**) which produces the pollen, to the female part (**stigma**). This process is called pollination. Usually, seeds can only be produced when pollen is transferred between flowers of the same species.



B

IMPORTANCE

Pollination can happen with the help of the wind, gravity or water, or some flowering plants can even pollinate themselves.



C

CONCERN

But most flowering plants – almost 90 percent – depend on a huge army of insects and other animals for pollination.



D

ACTION



But don't take our word for it! Go outside and pick a few flowers and then carefully take them apart. How many of the parts can you identify? Do they look more or less the same for each flower?

How do pollinators pollinate?

Let's look at the example of bees, the most famous of the pollinators. Bees visit flowers to collect pollen and nectar to bring back to the hive or nest. This pollen and nectar feeds other members of their **bee colony**, or, in the case of solitary bees, their offspring. They also build reserves for times of scarcity, e.g. the winter months. While foraging for pollen and nectar, bees collect a lot of pollen by accident, too, which sticks to the hairs on a bee's body. When the bee visits another flower for another meal, the pollen it is carrying will be deposited on to the new flower (stigma), fertilizing the ovules of the new flower, which helps it create seeds to reproduce. After pollination, the ovary becomes a fruit and the ovule becomes a seed.

F U N F A C T S !

NON-FLOWERING PLANTS ALSO MANAGE TO POLLINATE

Non-flowering plants such as ferns and mosses use the wind, and sometimes water, to pollinate. Some of them also spread pollen by releasing it through cones into the air. Many of our important staple crops, like wheat, rice, maize, barley and rye are wind-pollinated.



FUN FACTS!

SOME PLANTS SELF-POLLINATE

We have discussed **cross-pollination** above, in which pollen is transferred from the stamen of one flower to the stigma of another flower of the same species but on a different plant. However, some plants, such as sunflowers and certain orchids, are able to pollinate themselves, when pollen moves from one flower to another on the same plant, or even the same flower.



A

B

C

D





A.2 WHO'S POLLINATING?

Most of us think of bees when it comes to pollination. It's true that bees, both wild and domesticated ones, do perform more pollination than any other species. The bristle-like hairs on their bodies, which collect pollen, make them especially efficient pollinators. Honey bees pollinate more than 100 major food crops, however **there are actually around 20 000 different known species of bees around the world that act as pollinators.**

However, in addition to bees there are many other types of insects, birds and mammals, and even snails that are also pollinators. In fact, according to the International Union for the Conservation of Nature: "Nine percent of all currently recognized bird and mammal species are known or inferred to be pollinators." Can you think of any insects, birds or mammals in your region that could be pollinators? Why do you think they might be pollinators?



Rock stars of pollination

Busiest



©Gailia Tidens

Bees

We've already learned about how bees are pollination powerhouses. There's also a reason people talk about being as "busy as a bee." Did you know that in a single day, one honey bee may visit several hundred flowers?

Biggest



©AdobeStock/Rob Francis

Black and white ruffed lemurs

On the island of Madagascar where they live, black and white ruffed lemurs are the main pollinators of a tree called traveller's tree. Getting to the pollen of this tree's flowers requires some strength and agility.

Battiest



©AdobeStock/Beth Basch

Bats

They might be friends of vampires in the movies, but in real life bats are pretty good friends to us all. They help pollinate more than 300 fruits, including mangos, bananas and guavas. Bats do their thing in deserts and in the tropics.

A

IMPORTANCE

B

CONCERN

C

ACTION

D

©Pivovarov



Bluest



© AdobeStock/Patricia

Blue-tailed gecko

Yes, even lizards can be pollinators. This small lizard, found in Mauritius, helps pollinate because when it dips into a flower for nectar, pollen gets stuck to the scales on its forehead.

Brightest



© Wikimedia Commons/Terry Priest

Fireflies

Do you have fireflies where you live? These tiny bugs can light up summer evenings with their eye-catching glow. They also help pollinate many plants, including milkweed, goldenrod and wild sunflowers.

Sweetest



© Stephen Hopfer

Honey possum

Really cute right? :o) These mouse-sized creatures live in Australia, where they enjoy – and help pollinate – *Banksia* and eucalyptus flowers.

Beakiest



© AdobeStock/Rolf Nussbaumer/DanItaBelmont.com

Birds

Bird-pollinated flowers tend to be large and colourful, so birds can see them easily against a background of leaves. Common beaky pollinators include hummingbirds, spiderhunters, sunbirds, honeycreepers and honeyeaters.

Least popular

©Unsplash

Flies and mosquitoes

It's true they wouldn't win an insect popularity contest. But these guys – in spite of some annoying habits (like giving us itchy bites) – are important pollinators. Flies are second to bees in terms of importance as pollinating insects, and at high altitudes, take over from bees as major pollinators. Mosquitoes help pollinate orchids and many other flowering plants. Did you know male mosquitos don't even suck blood from animals? Their normal food is nectar!

Sneakiest

©Gulnia Tidens

Flower flies

These insects look like bees but are actually flies in disguise! You can tell the difference because they have only one pair of wings (as opposed to the two pairs of bees) among other physical differences. They are also called hover flies (or syrphid flies) because they like to hover over flowers and then quickly change direction. They are important pollinators of a wide range of plants.

TO EACH THEIR OWN, I GUESS...

Bees tend to prefer flowers with sweet fragrances or showy attractive petals. In fact, go easy on the perfume and lotion when you're around bees. Flowers that are pollinated by flies can have stinky smells, like rotting meat or dung, for example. There's actually a flower called the corpse flower, also known as "the worst smelling flower in the world".



A TRAGIC (POLLINATOR) TALE OF LOVE AND LOSS



Get out your hankies, kids, you are going to need them. The story of the fig wasp is one of nature's most poignant examples of the delicate connections between plants and animals, in this case, symbiosis. The fig tree and fig wasp are an example of coevolution – when two or more species affect each other's evolution. Flowering figs are not easy to spot and need a special process for pollination. Fortunately for the fig tree, the fig wasp has a special sense of smell that leads it to them. Unfortunately for the fig wasp – after laying her eggs inside a fig flower (that will ripen into a fig), she cannot climb back out and dies inside the fig. When the eggs hatch, only the female babies escape, as the males do not have wings. In a tremendous display of team spirit, however, the doomed males dig the way out for the females.



© Wikimedia Commons 3.0/GMK

WHO ARE THE NECTAR ROBBERS?

Some pollinators are known as nectar robbers, because they manage to steal nectar from flowers without collecting pollen on their bodies! In other words, they get what they want from the plant without returning the favour. Examples of nectar robbers include species of carpenter bees and some stingless bees.

THE NIGHT BRIGADE

Did you know that pollination happens around the clock? While pollinators such as birds and butterflies do their thing during the daylight, after dark, a whole new army of pollinators takes over. These include moths, beetles, bats and even a type of bee, *Megalopta*. They tend to visit light-coloured flowers with a strong fragrance that can be more easily spotted in the dark.





The queen of pollinators - let's learn more about bees

When you think of bees, are you also reminded of honey? In fact, only social bees – those that live in a colony with a hive – produce large quantities of honey which they use to feed the colony during the winter. However, most bees are solitary, they live alone or with their few offspring, and don't produce enough honey for commercial production. Did you know there are more than 20 000 known bee species? Let us study a few of them in the next pages.



Honey bees

Honey bees are an example of social bees. They are super important pollinators and they live in hives or colonies. Honey bees pollinate more than 100 important crops. They have one queen who runs the place, who is surrounded by tens of thousands of female workers and significantly less male bees called drones. Coolest of all, when a worker bee discovers a good source of nectar or pollen, she goes back to the hive and does a waggle dance to let the other bees know where it is. Dare you to do a waggle dance for your friends next time you discover a good place to eat.



© Wikimedia Commons/
Louise Decker

➔ Learn more about how honey bees pollinate – and do the waggle dance – in this video: www.smithsonianmag.com/videos/category/science/whats-the-waggle-dance-and-why-do-honeybees-do-it

Dwarf honey bee

Dwarf honey bees are the smallest species of honey bee. They are mostly found in warm climates, in countries such as Cambodia, India, Iran, Oman and Thailand – almost in all parts of Southeast Asia. They visit a broad range of plants and tend to use tree branches or similar supports for their nests. Younger bees work within the nest, doing maintenance work; older bees are in charge of protecting and foraging.



© Wikimedia Commons/
Oliver Pfanz

Giant honey bee

As you may have guessed, these are the largest of the honey bee species. These bees like to hang out together. A single tree can sometimes have up to 50 giant honey-bee nests in it, with one hive containing 60 000 bees. That's a tree you might want to steer clear of, as giant honey-bee colonies can also be quite aggressive.



© Wikimedia Commons/
Petewhalen



Bumblebees

Bumblebees are another example of social bees. They are generally larger than honey bees and are very important pollinators. There are about 255 different species of bumblebees all over the world! The largest is the *Bombus dahlbomii* of South America, whose queens have been described as resembling flying mice.



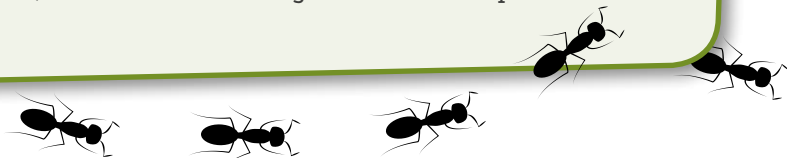
Stingless bees

This group, also called meliponines, encompasses around 300 species, which mostly live in tropical and subtropical areas of the world. Stingless bees are social and they store honey similar to that of honey bees. They do not sting, but will defend by biting if their nest is disturbed. They are important pollinators for tropical forests and also for many crops.



POLLINATOR MEET AND GREET

Next time you hit the outdoors, pay attention to the pollinators you might meet. Do you see bees, wasps, butterflies, moths, flies, beetles, ants or lizards? All of them are pollinators! In fact, any creature that moves pollen from flower to flower is a pollinator. Spend some time outside observing the birds, insects and animals you see, to discover which might fit that description.



Mason bees

Just like actual masons – builders and stoneworkers – mason bees build their nests using pebbles and mud. Mason bees are solitary bees and normally occur in temperate habitats. Mason bees help pollinate many kinds of fruit, including blueberries and apples, as well as almonds.



©Bron Wright

Sweat bees

Next time you're all sweaty after running or playing football, don't worry, someone out there still thinks you're cool: Halictids. These bees are commonly known as sweat bees as they are often attracted to perspiration. These solitary bees are small and they play an important role in pollinating plants wherever they live, including wildflowers, alfalfa and sunflowers.



©Bron Wright

Orchid bees

These solitary, shiny, metallic-coloured bees have extremely long thin tongues, which can equal twice the length of their bodies. But the most interesting thing about them? Male orchid bees collect scents in special chambers in their hind legs – they use this “perfume” to attract female bees! The orchid flower is especially successful at luring these bees to them with a range of scents, which is where this bee gets its name from. Orchid bees are very important pollinators for a range of plants in tropical forests, not just orchids.



©MadsStock





Leafcutter bees

If you notice a neat crescent or almost circular shape cut out of the leaves on your plants, it's most likely a leafcutter bee at work. Roses and bougainvillea are some of their favorites. These solitary bees like to make their nests in cavities and use the leaf pieces to line the cavity, ending up with a tube-like shape. This is where they lay their eggs. Leafcutter bees are important and efficient pollinators for alfalfa, wildflowers, fruits (like blueberries) and vegetables.



©Bon Wright

Carpenter bees

Carpenter bees are often mistaken for bumble bees, only that their abdomens aren't hairy (at least on the dorsal (top) side). These solitary bees nest in soft wood, creating tunnels and chambers where they hang out and lay their eggs. They buzz like saws when building these nests, which explains their name, but they don't eat wood. Instead, they visit flowers for nectar and pollen and are important pollinators for plants such as tomatoes, blueberries, eggplants and cranberries.



©Wikimedia Commons/
JoshHecken

BUZZ POLLINATION

Some bees, like the bumblebees and carpenter bees described above, have the ability to vibrate their flight muscles while hanging below a flower. This process, called buzz pollination, shakes the pollen loose from the flower's anther. And you thought **you** had cool moves!



You can also be a Pollinator!

Go outside and find a flower that has pollen grains like the one in the picture. Using a paintbrush or your finger, gently collect some pollen. Now spread your pollen to other flowers. Imagine doing this for several hundreds of flowers in one day! Gives you a new respect for pollinators, doesn't it? Here is a helpful video: www.generationgenius.com/videolessons/pollination-and-seed-dispersal-video-for-kids

BACKGROUND INFORMATION

*"How doth the little busy bee
Improve each shining hour
And gather honey all the day
From every opening flower"*

Isaac Watts

B

WHY ARE POLLINATORS IMPORTANT?





B.1 OUR BEST FRIEND

Pollinators ensure we have a range of healthy and delicious foods! And it's not just about quantity as pollinators also help improve the quality of crops. So, next time you see a bee, a fly, an ant or a moth, maybe don't tell them to buzz off.

What to say next time you bite into an apple, a square of chocolate or a tomato?

Thanks, pollinator.





Benefits of pollinators

Increase biodiversity

Maintain ecosystems

Seventy-five percent of the world's fruit and seeds for human use depend at least in part on pollination.

The volume of agricultural production that depends on animal pollination has gone up by **300 percent** in the past 50 years.

The price tag of global crops directly relying on pollinators is estimated to be between **USD 235** and **USD 577 billion** a year.

Pollinators contribute to crops that provide **biofuels** (e.g. canola and palm oils), **fibres** (e.g. cotton), **medicines**, **forage** for livestock and **construction materials**.

Some species also provide materials such as **beeswax** for candles and musical instruments, and arts and crafts.

Source: IPBES

Generate cultural ecosystem services

Provide micronutrient-rich foods



WILD THING, YOU MAKE MY HEART SING

In fact, out of 105 common crop plants

98 are visited by bees and wasps

76 have fly visitors

57 have butterfly and moth visitors

54 are visited by beetles

and 32 have ant visitors!



The vast majority of pollinator species are wild, including ground-nesting bees, some species of flies, butterflies, moths, wasps, beetles, thrips, birds, bats and other vertebrates. While beekeeping provides an important source of income for many rural livelihoods, both wild and managed pollinators play globally important roles in crop pollination. In fact, wild bees are among the most important pollinators for some crops – even outperforming managed bees leading to better fruit. Overall, a diverse community of pollinators helps provide more effective and stable crop pollination than any single species and creates resilience to changes in land and climate.

(Sources: FAO and IPBES)

CROPS THAT DEPEND ON POLLINATORS

Let us see some of the world's major crops that depend on pollinators and explain why these crops are important.





BERRIES



STRAWBERRY



Mainly bees



Strawberries are excellent sources of vitamin C and are rich in **antioxidants**



In 2016, the global strawberry market reached USD 15.9 billion

BLUEBERRY



Over 115 types of bees



High in vitamin C, vitamin K, fibre and other antioxidants



A favourite in smoothies and muffins, blueberries are a pretty hot commodity. The global blueberry market is forecasted to reach USD 4.5 billion by 2024. Let's also not forget pollinators are important for wild berries such as European blueberry/bilberry

RASPBERRY



Although raspberry flowers can self-pollinate, bees still accomplish 90 to 95 percent of the pollination



High in antioxidants, fibre and flavonoids



Global raspberry production is estimated at 400 000–500 000 tonnes annually, with the majority produced by the Russian Federation, the United States of America, Serbia, Poland and Chile. Pollinators are also important for raspberries wild cousins too



WHO'S POLLINATING



NUTRITIONAL VALUE



ECONOMIC IMPORTANCE

POPULAR FRUIT



©Unsplash

APPLE



Honey bees, bumblebees, solitary bees, hover flies



Great sources of fibre and vitamin C, there's probably some truth to the old saying: "an apple a day keeps the doctor away"



If you're not a huge fan of apples, you are in a rare category. In 2016, global apple sales hit USD 7.2 billion

APRICOT



Bees



Good source of fibre, vitamin A and antioxidants



Apricots are native to Asia, and Turkey and Iran are the biggest exporters. The dried apricot market alone is projected to reach USD 836 million by 2026

ORANGE



Honey bees, bumblebees



Oranges have more than 100 percent of your recommended daily amount of vitamin C. Oranges are also high in fibre, vitamin A and calcium



Around 76.6 million tonnes of oranges are produced per year. Brazil, Spain, China and the United States of America are some of the major producers



WHO'S POLLINATING



NUTRITIONAL VALUE



ECONOMIC IMPORTANCE



POPULAR FRUIT

CHERRY



Honey bees, solitary bees, bumblebees, flies



A one-cup serving of cherries has about 5 000 antioxidants in it. Cherries are believed to help reduce pain and inflammation. They are high in vitamin C, fibre and potassium



Fresh cherries are delicious, but cherries are also used in a variety of consumables, like pies, jams, ice-cream, candies and drinks. It's no wonder then that the market for fresh cherries is expected to reach USD 5.22 billion by 2022

TOMATO



Although mainly wind pollinated, tomatoes also get help from pollinators such as bumblebees and carpenter bees



Tomatoes are nutritional powerhouses: They are high in carotenoids, which are antioxidants. They also contain large amount of vitamins E and C and many other nutrients



In 2018, the global tomato market revenue amounted to USD 190.4 billion. Whew! That's a lot of tomatoes...

CUCUMBER



Honey bees, squash bees, bumblebees, leafcutter bees



High in vitamin C, potassium and fibre, plus very hydrating



In 2016, world production of cucumbers and gherkins was 80.6 million tonnes, led by China with nearly 77 percent of the total



WHO'S POLLINATING



NUTRITIONAL VALUE



ECONOMIC IMPORTANCE

POPULAR FRUIT

AVOCADO



Bees, flies, bats



Contains nearly 20 vitamins and minerals and the only fruit with heart-healthy monounsaturated fat



Avocado has recently become one of the world's trendiest fruits and a favourite "superfood". In 2016, global imports of avocado were projected to hit USD 4.82 billion

WATERMELON



Honey bees, bumblebees, solitary bees



They are high in healthy fruit compounds such as citrulline and lycopene, as well as vitamin C, vitamin A, potassium, and water. Watermelon seeds, too, are healthy and are sold and consumed in their own right. They contain vital nutrients such as proteins, amino acids, and omega-3 and -6 fatty acids



Originally from West Africa, watermelons are cultivated in many parts of the world now. In 2017, global production of watermelons was 118 million tonnes



WHO'S POLLINATING



NUTRITIONAL VALUE



ECONOMIC IMPORTANCE



TROPICAL FRUIT



PAPAYA



Moths, birds, bees



Excellent source of vitamin C as well as fibre



Papayas are produced in about 60 countries, with the bulk of production in developing countries. Global production of papaya reached an estimated 13.6 million tonnes in 2018

MANGO



Bees, flies, wasps



High in vitamin C, fibre and folate



Mangos are native to South and Southeast Asia and are now enjoyed all over the world

GUAVA



Honey bees, stingless bees, bumblebees, solitary bees



Good sources of vitamin C, vitamin A, potassium and fibre



Native to Mexico, Central America, the Caribbean and parts of South America, guava is also grown in many other tropical and subtropical regions around the world. In 2016, India was the largest producer of guavas, with 41 percent of the world's total production.



WHO'S POLLINATING



NUTRITIONAL VALUE



ECONOMIC IMPORTANCE

TROPICAL FRUIT

PINEAPPLE



Hummingbirds, bats, honeybees, pineapple beetles



Rich in vitamin C and manganese



Pineapples are popular around the world, not only to be eaten fresh, but also in drinks and desserts. The global pineapple market amounted to USD 14.9 billion in 2016

COCONUT



Insects and fruit bats



Rich in fibre and several minerals



The global coconut products market was valued at USD 11.5 billion in 2018. They don't just make a great snack. People drink coconut water and use coconuts for a variety of other products: oils, creams, and hair and beauty products



WHO'S POLLINATING



NUTRITIONAL VALUE



ECONOMIC IMPORTANCE



© iStockphoto.com



POPULAR VEGETABLES



©Unplash

ONION



Bees and flies



Onions contain lots of antioxidants and other healthy plant compounds



It's hard to find any cuisine from anywhere in the world that does not use onions. In 2018, global sales from onions exported by countries reached USD 3.5 billion

BROCCOLI



Honey bees, solitary bees



Broccoli is a rich source of vitamin C and vitamin K



Broccoli is wonderfully versatile. Raw, it makes a good snack, and cooked it does great in soups, stir-fried or steamed. Clearly everyone agrees, because in 2017, global production of broccoli (combined with cauliflower) was 26 million tonnes



WHO'S POLLINATING



NUTRITIONAL VALUE



ECONOMIC IMPORTANCE

POPULAR VEGETABLES

SQUASH



Honey bees, squash bees, bumblebees, solitary bees



Different varieties of squash have different benefits, including cancer prevention, reducing inflammation, reducing blood pressure and strengthening the immune system overall



The squash family includes squash such as butternut squash or acorn squash, pumpkins, gourds and courgettes (also called zucchini). In 2017, the world produced 27.44 million tonnes of these guys

OKRA



Honey bees, solitary bees



Okra is rich in magnesium, folate, fibre and antioxidants such as vitamin C



Also known as ladies' fingers (not that we've ever seen a lady with fingers like that), okra is mainly grown in India, Nigeria, Sudan, Pakistan, Ghana and Egypt



WHO'S POLLINATING



NUTRITIONAL VALUE



ECONOMIC IMPORTANCE

© iStockphoto



POPULAR VEGETABLES

TURNIPS



Honey bees, solitary bees, flies



Turnips are full of fibre and many vitamins, as well as minerals like manganese, potassium, iron and calcium



In 2018, the global production of turnips along with carrots was 44.3 million tonnes. Share your favourite turnip recipe with us!

CABBAGE



Honey bees and other insects



Cabbage is packed with nutrients such as vitamin C, vitamin K, vitamin B6, folate, calcium and manganese



The global cabbage market revenue amounted to USD 39.4 billion in 2018

BELL PEPPER



Honey bees, stingless bees, bumblebees, hover flies



Bell peppers are great sources of vitamins A and C, potassium, folic acid and fibre



International sales of exported bell peppers along with chili peppers totaled USD 5.5 billion in 2018



WHO'S POLLINATING



NUTRITIONAL VALUE



ECONOMIC IMPORTANCE

NUTS



ALMOND



Honey bees



High in protein, fibre and vitamin E



The multibillion-dollar almond industry includes raw almonds as snacks, almond milk, and hair and skin care products

CASHEW



Honey bees, stingless bees, bumblebees, butterflies, flies, hummingbirds



Cashews are packed with vitamins, minerals and antioxidants, including vitamins E, K and B-6, copper, phosphorus, zinc and iron



Salted, roasted, or plain, cashews are a pretty popular snack. In 2018, the global cashew market was valued at USD 9.9 billion



WHO'S POLLINATING



NUTRITIONAL VALUE



ECONOMIC IMPORTANCE



HERBS & SPICES



CARDAMOM



Honey bees, solitary bees



Good source of potassium and calcium, and fights inflammation



This spice, the world's third most expensive, is used a lot in South Asian cooking, even to spice up a warm cup of chai

LAVENDER



Bees, hummingbirds, butterflies



Lavender is used in teas and oils. People use it for anxiety, insomnia, skin care and beauty, and to help digestive issues and headaches



In 2017, the global market value of lavender oil alone was USD 33.76 million

CORIANDER



Honey bees, stingless bees, solitary bees



Coriander is a great source of dietary fibre, manganese, iron and magnesium. It is also high in vitamin C, vitamin K and protein, and contains small amounts of calcium, phosphorous, potassium, thiamin, niacin and carotene



Also known as cilantro, this flavourful herb is used as a garnish, especially in some countries of Latin America and South Asia. Its seeds, too, are added as seasoning to many dishes



WHO'S POLLINATING



NUTRITIONAL VALUE



ECONOMIC IMPORTANCE

HERBS & SPICES

ALLSPICE



Honey bees, solitary bees (including sweat bees)



Allspice is rich in vitamin A, vitamin B-6, riboflavin and vitamin C



Allspice is used around the world in everything from curries to desserts



WHO'S POLLINATING



NUTRITIONAL VALUE



ECONOMIC IMPORTANCE





OTHER FAVOURITES



© Unsplash

CACAO



Midges (small flies) and stingless bees



Dark chocolate, produced from cacao, is a great source of antioxidants and is also high in fibre, iron, magnesium and healthy fats



Chocolate is pretty popular around the world. The global chocolate market is expected to reach USD 161 billion by 2024

COFFEE



Bees and flies



Boosts energy and also contains antioxidants



Coffee is one of the most traded agricultural commodities in the world: in 2017 alone, 70 percent of total coffee production was exported, worth USD 19 billion



WHO'S POLLINATING



NUTRITIONAL VALUE



ECONOMIC IMPORTANCE

© Unsplash

POLLINATOR PETS

They might not be as cute as puppies, but hey, they make more useful pets...

Did you know that the practice of **beekeeping** dates back to 9000 years ago? Scientists believe that prehistoric people may have domesticated wild bees or gathered honey and wax for medicines and food. For example, they used **beeswax** to waterproof pots and used honey as a sweetener.

Today, of course, millions of people around the world breed bees, mainly a few species, including the western honey bee (*Apis mellifera*), the eastern honey bee (*Apis cerana*), some bumble bees, some stingless bees and a few solitary bees. The honey bee is the most widespread managed pollinator in the world, with **about 81 million hives around the world producing around 1.6 million tonnes of honey annually** (Source: UN Environment).





Managed bees can be set up anywhere, for example in areas where there are not enough pollinators or in greenhouses to help plants thrive. People who manage bees are called **beekeepers** or **apiarists**. Beekeeping or apiculture is a set of activities related to maintaining colonies of social bees. It may provide livelihood and a source of income for many rural areas and small farms. There is also the practice of meliponiculture, which involves keeping stingless bees. There are many benefits to beekeeping:

- * It helps ensure large, healthy bee populations to promote successful pollination. So, beekeeping is a great way to help safeguard bees (they're in trouble – we'll learn more up ahead) and ensure **pollination**.
- * It allows beekeepers to harvest the honey produced by honey bees, to use and sell.
- * It allows beekeepers to produce other bee substances, including **bee pollen**, beeswax and royal jelly (see below for more details).
- * It helps environmental health by planting and protecting trees, which are natural bee habitats.

However, the picture is not all sweet. There is increasing evidence that managed honey bees can pose a sticky situation for wild native pollinators. According to the National Geographic Society: "When flowers are abundant, there is plenty of pollen for both honey bees and their wild cousins. But in many landscapes, or when an orchard stops blooming, farmed honey bees can compete with wild bees for food, making it harder for wild species to survive."

- ➔ Learn more at:
<https://blog.education.nationalgeographic.org/2018/01/29/honeybees-help-farmers-but-they-dont-help-the-environment>

Examples of bee products

Here are some of the major products coming from bee keeping:

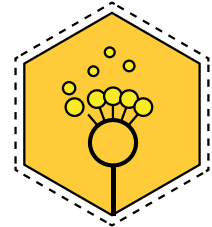
Honey

We all know and love honey. So much so that we have a whole section on this below.



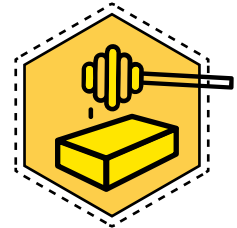
Bee pollen

Bee pollen is a ball of pollen made by social bees when they land on a flower. They then carry these balls back to the hive in sacs carved pouch-like space on their legs and store them in the hive's honeycomb, to feed the colony. Bee pollen is a mixture of bee saliva, pollen and nectar, and it contains many vitamins, minerals and antioxidants, making it extremely healthy. Studies have linked bee pollen to health benefits such as decreased inflammation, as well as improved immunity, and wound healing. Beekeepers collect the pollen and sell it on the market.



Beeswax

This is a natural wax produced by honey bees to form cells for honey storage and to protect larvae in the hive. Humans collect beeswax and use it in a variety of beauty products, such as lip balm and hand creams. It's also used to heal broken skin or as an anti-inflammatory, as well as to make candles.



Royal jelly

This is secreted by honey bees to nourish larvae as well as queen bees. It's often sold as a dietary supplement to treat a variety of physical problems and chronic diseases.





Propolis

This is a type of “bee glue” that honey bees make by mixing saliva and beeswax with sap or resin from cone-bearing trees. It has a long history of medicinal use, dating back to 350 BC! People through the ages have used propolis for treating abscesses, healing wounds and tumours, and for treating minor burns.



Natural antibiotic

According to recent research, Api137 is a natural product made by bees, wasps and hornets that is an antimicrobial compound, which could be used to help create a new antibiotic. Api137 is a natural product made by bees, wasps and hornets.



@Unsplash

How is honey made?

Honey bees collect nectar from flowers by sucking it out with their tongues. They may also collect honey dew (sugar excretions) ejected by aphids and some scale insects that feed on plant sap. They store it in what's called their honey stomach, which is separate from their food stomach. When they have a full load, they return to the hive where they pass it off to other worker bees who process it for about half an hour. It's passed from bee to bee, until it slowly turns into honey, mixing with bee-added enzymes. Then the bees store it in honeycomb cells, which are like tiny jars made of wax. The honey is still a bit liquid, so they fan it with their wings to dry it and make it stickier. When it's ready, they seal the cell with a wax lid to keep it clean. They don't make very much of it, though.

It takes at least *eight bees all their life to make one single teaspoonful.*



©Unsplash

What is in honey?

Now you know the painstaking labour needed to produce honey, let us find out more about this golden substance:

- ✦ Honey contains many important antioxidants which are linked to reduced risk of heart disease, strokes, and even some types of cancer.
- ✦ It contains antibacterial and antifungal properties as well as hydrogen peroxide, an antiseptic, so it is used to treat wounds.
- ✦ It contains several enzymes, which help us digest food better.
- ✦ It helps treat stomach issues and soothes sore throats.
- ✦ It is a widely used sweetener for teas, desserts, and other edibles, and is a healthier option than sugar.



Different types of honey

Honey bees visit a variety of flowers, and make their honey from a variety of flowers or floral sources. This affects factors such as the colour and taste of the honey. Once you become a true honey connoisseur, you might be able to tell the difference when you taste different types of honey. For example, buckwheat honey is dark and heavy, while orange blossom honey is light-coloured and sweet. Other widely available honeys include clover honey, bamboo honey, wildflower honey, goldenrod honey, sage honey and manuka honey. Which types of honey are available where you live? What do they taste like? Can you tell the difference between different varieties?

- ➔ Learn more about how to choose your honey in **Activity Sheet 7** on page 128.



WORLDWIDE THERE ARE
MORE THAN **300 MONOFLORAL** HONEY TYPES



Honey ranges in colour – from water white to dark brown/black

Fiddle-de-dee, fiddle-de-dee,
the fly has married the bumblebee!



You may not have heard that silly old nursery rhyme, but chances are you know of some poem, story, song or folktale that features a pollinator. Pollinators have a significance for humans that goes far beyond their ability to improve our food systems. They have fascinated people through the ages, and this shows up in our art, literature, music and even our spiritual texts. According to IPBES:

“Artistic, literary and religious inspiration from pollinators includes popular and classical music (e.g. I’m a King Bee by Slim Harpo, the flight of the Bumblebee by Rimsky-Korsakov); sacred passages about bees in the Mayan codices (e.g. stingless bees); the *Surat An-Nahl* in the Qur’an, the three-bee motif of Pope Urban VIII in the Vatican, and sacred passages from Hinduism, Buddhism and Chinese traditions such as the Chuang Tzu. Pollinator-inspired technical design is reflected in the visually guided flight of robots, and the 10 metre telescopic nets used by some amateur entomologists today.”

Which pollinators are important in *your* culture?

Can you think of any books, music, or art from your culture that feature this pollinator?

Why is this pollinator significant where you live?



B.2 POLLINATORS AND THE SDGs

As if it wasn't enough to keep us fed, pollinators perform a range of other services including helping us achieve the Sustainable Development Goals. Let us explore some of the most important ones.

KEEPING US HEALTHY

As noted above, many of the very nutritious, **micronutrient**-rich foods, like fruits, some vegetables, seeds, nuts and oils, would disappear without pollinators. In fact, without pollinators, our diets would be severely limited, and it would be more difficult to get the variety of vitamins and minerals that we need to stay healthy. Even milk depends on pollinators! They help grow cattle feed such as clover and alfalfa so without pollinators, there would be less milk and cheese.



By helping our nutrition, pollinators are scoring big on **Health and Well-being (SDG 3)**.

ENSURING OUR PLANET IS HEALTHY

Pollinators, through their pollination of seed-plants, help keep **ecosystems** (such as rainforests, mangroves, grasslands and woodlands) healthy and balanced. In high mountain forests, which are too cold for most bees, pollinators like bats play a huge role in plant pollination. In addition, pollinators that tunnel in the ground help improve soil quality by mixing nutrients and improving water flow around roots.



By helping to protect our planet, pollinators are scoring big on **Climate Action (SDG 13)** and **Life on Land (SDG 15)**.

HELPING PEOPLE EARN A LIVING

Several of the crops produced with pollination, for example, cocoa and coffee, provide a key income for **smallholder farmers** and family farms in developing countries. Moreover, as we know by now, the important work of pollinators also provides us with many plant-derived medicines, fibres, seeds, nuts and oils. According to IPBES (2016): "...antibacterial, anti-fungal and anti-diabetic agents are derived from honey; *Jatropha* oil, cotton and eucalyptus trees are examples of pollinator-dependent biofuel, fibre and timber sources respectively; beeswax can be used to protect and maintain fine musical instruments." These are just a few examples that show how important pollinators are in helping produce different plant-derived goods that may support livelihoods. In addition, pollination services are worth between USD 235 and USD 577 billion towards annual global food production.



By helping people's incomes, pollinators are scoring big on **No Poverty (SDG 1)** and **Decent Work and Economic Growth (SDG 8)**.



Making the rest of us look bad...

With all they do, pollinators make the rest of us look like major underachievers. We might never be as useful as pollinators, but at least we can do a lot to support and promote them in their important work by valuing and conserving them. Because sadly, pollinators are facing many dangers and challenges, and some of them might even disappear.

We'll learn more about this in the next section.

BACKGROUND INFORMATION



C

BEE CONCERNED



POLLINATORS

A

IMPORTANCE

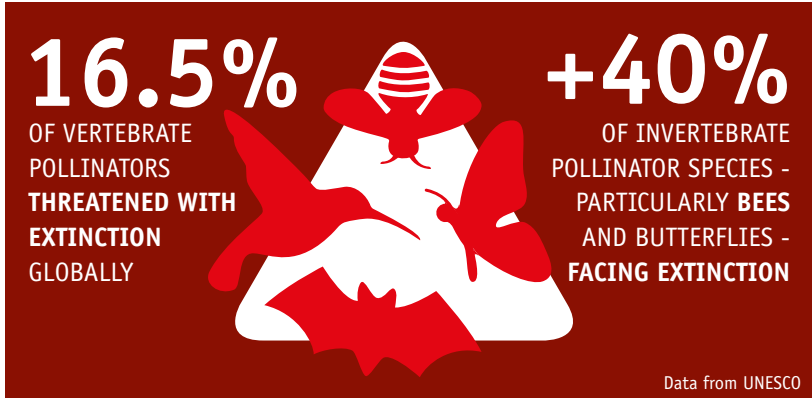
B

ACTION

D



Here's some news that might sting: many pollinators – both **invertebrates** such as insects and **vertebrates** such as birds and mammals – **ARE IN TROUBLE!**



The exact global state of wild pollinators is unknown. From the data we have, we know that wild pollinators are declining at local and regional levels in Northwest Europe and North America. Less data for wild pollinators are available for Latin America, Africa, Asia and Oceania, but local declines have been recorded. We urgently need better monitoring to understand the status and trends for pollinators around the world. (Source: IPBES)

Why, though?

As is the case with most of Mother Earth's troubles, we humans are largely responsible.

Human actions have severely altered **75%** of the planet's terrestrial environments.

Source: IPBES, 2019

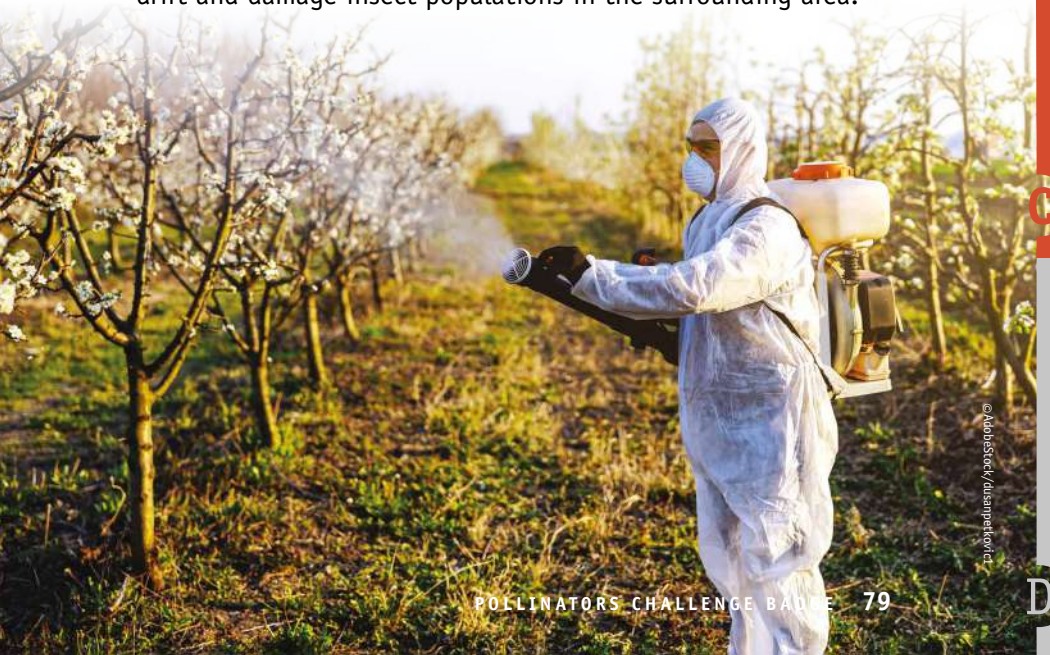


C.1 POLLINATORS ARE IN TROUBLE

Here's a quick look at human activities that are hurting our helpful friends.

Land-use change and habitat loss. Pollinators depend on the diverse landscapes rich in nectar and pollen for their survival and their nesting sites. One of the biggest reasons behind their disappearance is the way humans are using and changing landscapes for our own use. For example, in many places people are removing semi- and natural habitats (including forests) and replacing them with crops and livestock reducing both pollen sources and nesting habitats.

Pesticides. People use pesticides to control unwanted plants, insects, rodents or diseases. There are many types of pesticides, but **insecticides** are the most harmful to pollinators. Some types are extremely harmful to the nervous systems of pollinators, killing them or severely affecting the way they function. This is especially the case when applied to plants during the blooming period when pollinators are active or in windy weather, causing the spray to drift and damage insect populations in the surrounding area.



© AdobeStock/dusanpetkovic



Pests and diseases. All animals and insects can become ill and/or contract diseases. For example, as bees forage for pollen and nectar they may pick up harmful organisms and then bring them back to the hive, making the entire colony ill and affecting colony health. Mass breeding and large-scale transport of managed pollinators can increase their risks for getting diseases or parasites. Better regulation of their trade and use can help prevent disease from spreading among both managed and wild populations. Greater emphasis on hygiene and the control of harmful pathogens and parasites are also important.

Pollution. Insect pollinators locate flowers, in part, through their scent, but air pollution affects this scent, making it harder for bees and other insects to find the flowers they love to visit. This causes both pollinators and flowering plants to decline, as one struggles to find food and the other is not sufficiently pollinated.



Invasive alien species. These are plants and animals that are not native to an area, but are introduced there, either by accident or on purpose. They often disrupt the balance of the existing ecosystem, harming the native plant and animal species. For example, many pollinators have co-evolved with the plants they visit. But alien plants are sometimes inaccessible to these pollinators, who visit them to look for nectar in vain and often end up pollinating them without getting any benefit for themselves. **Invasive animal species** are often **parasites** or carry **pathogens** that severely reduce pollinator numbers.

THE STUFF OF HORROR MOVIES – DON'T READ THIS IF YOU SCARE EASILY

As if bees didn't have enough to worry about, the Asian giant hornet is on the move. In spring 2020, the insect was spotted in North America and Europe, creating fear among beekeepers. This hornet – whose scientific name is *Vespa mandarinia* (*Vespa velutina* in Europe) – viciously attack honey bees by entering their hives and ripping off the heads of large numbers of bees. Warned you not to read this. Anyway, this behaviour has earned it the nickname of “murder hornet”, and let's hope scientists and beekeepers figure out a way to prevent it spreading new terrain.





IMPACT OF PESTICIDES


Globally, over **2.3 billion kilos of pesticides** are used each year for agricultural purposes, forest and rangeland management, and disease control, as well as in homes, and on lawns, gardens, golf courses and other private properties.

(Data source: Smithsonian Institution 2019)




Lizards, including pollinating species such as geckos and wall lizards, **can be poisoned from eating pesticide-affected insects.** This can impair their movement, making them more vulnerable to predators. It can also affect their reproduction and lead to starvation.






Millions of birds die each year from eating either pesticide-affected insects or the seeds of pesticide-affected plants. Even if the birds don't ingest enough pesticide to kill them, small amounts can cause them to eat less, lose weight, become lethargic and be less able to care for their young. Pesticides can also lead to a decrease in the production, fertility or hatchability of bird eggs.



Like other insectivore pollinators, studies indicate that **bats are highly sensitive to pesticides**. Ingesting pesticides harms their nervous systems and their ability to find food. It is also believed to harm their immune systems and lead to disease.



Herbicides, or weedkillers, harm the pollinators that depend on the affected weeds. For example, when monarch butterflies are still caterpillars they feed exclusively on milkweed. But herbicides destroy milkweed and scientists believe its disappearance is causing monarch butterfly populations to decline.



DID YOU KNOW?

There are lots of alternatives to pesticides that are not harmful to pollinators. Many stores offer organic/eco-friendly pesticide alternatives. You can even make some of these at home.

Learn more at: www.rd.com/home/gardening/make-own-nontoxic-pesticides.

Growing plants that naturally repel pests is another great option. This is a system used in **organic farming**, which avoids the use of synthetic pesticides. For example, you can plant garlic to keep away aphids or grow basil, which protects tomatoes. Maintaining healthy soil is also important in strengthening plants' immune systems, helping them to combat pests. And, according to the United States of America. Environmental Protection Agency, lots of animals and bugs out there can help in the quest to remove pests: "Beneficial predators such as purple martins and other birds eat insects; bats can eat thousands of insects in one night; ladybugs and their larvae eat aphids, mealybugs, whiteflies, and mites. Other beneficial arthropods include spiders, centipedes, ground beetles, lacewings, dragonflies, big-eyed bugs, and ants.... you can also buy and release predatory insects."



Integrated pest management

Integrated pest management (IPM) is a system that takes a big picture approach to preventing pests. It involves managing the entire ecosystem. It combines different approaches in order to grow healthy crops and minimize the use of pesticides. FAO promotes IPM as the preferred approach to crop protection and regards it as a pillar of both sustainable crop production as well as pesticide risk reduction. For example, IPM can include taking steps to ensure healthy crops that can withstand pest attacks, using disease-resistant plants, promoting beneficial insects that can help control pests, or improving soil health to help plants be healthier and stronger. Polyculture agriculture – in which many types of crops and plants are grown together as opposed to monoculture (growing just one plant e.g. just corn or soybeans) – is more resilient to pests and often hosts natural predators that will help take care of pests.

“Rather than simply eliminating the pests you see right now, using IPM means you’ll look at environmental factors that affect the pest and its ability to thrive. Armed with this information, you can create conditions that are unfavourable for the pest.”

(Source: ipm.ucanr.edu)



Climate change. Global warming, temperature fluctuations, extreme weather, and **hazards** such as **droughts** and **floods** are hurting pollinators and their habitats. Climate change is also altering flowering patterns, thus disrupting pollination. In a recent study, scientists concluded that “bumblebees are in drastic decline across Europe and North America owing to hotter and more frequent extremes in temperatures”. In the words of one of the scientists on the team: “We were surprised by how much climate change has already caused bumblebee declines. Our findings suggest that much larger declines are likely if climate change accelerates in the coming years, showing that we need substantial efforts to reduce climate change if we are to preserve bumblebee diversity”.

(Source: www.theguardian.com/environment/2020/feb/06/bumblebees-decline-points-to-mass-extinction-study?utm_term=Autofeed&CMP=tw_t_gu&utm_medium=&utm_source=Twitter#Echobox=1581016921)

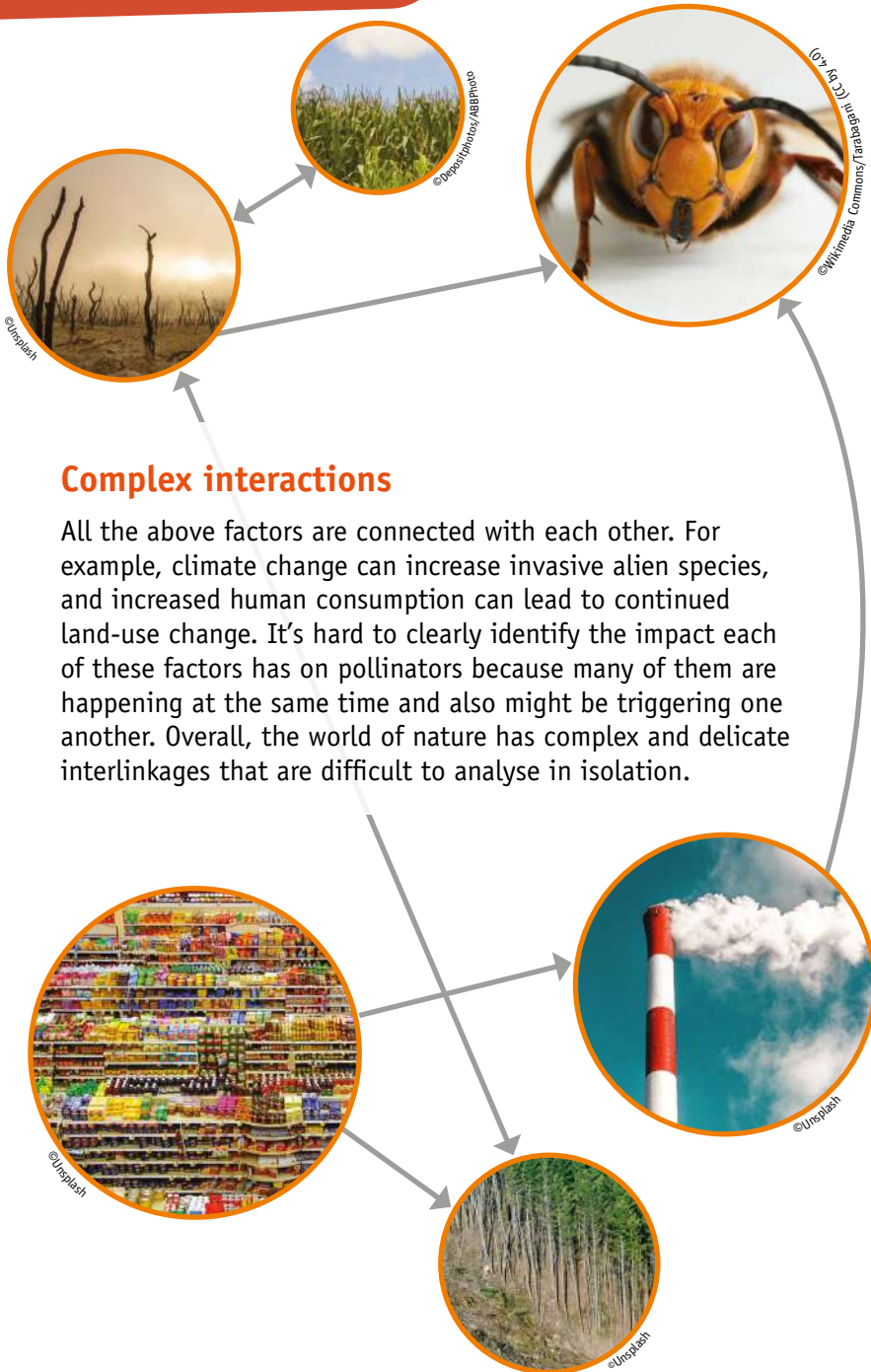
Human consumption patterns.

Our planet has provided us with an abundance of natural resources. But we are not using them responsibly and we currently consume far beyond what our planet can provide. For example, deforestation is happening so fast that an area of forest equivalent to five football fields disappears every minute. We must learn how to use and produce in **sustainable** ways that will undo the harm that we have inflicted on the planet (Source: globalgoals.org). A healthier planet means healthier pollinators, too.



©Saadia Iqbal/Taken at Smithsonian National Zoo, Washington, DC





Complex interactions

All the above factors are connected with each other. For example, climate change can increase invasive alien species, and increased human consumption can lead to continued land-use change. It's hard to clearly identify the impact each of these factors has on pollinators because many of them are happening at the same time and also might be triggering one another. Overall, the world of nature has complex and delicate interlinkages that are difficult to analyse in isolation.



Some good news!

At the time of this Badge's creation, we are in the middle of a global shutdown, to prevent the coronavirus from spreading. COVID-19, the name of this global virus, has caused immense suffering and many deaths around the world. But there is a ray of light in all of this too. Life is improving for bees! There are three main reasons for this:

1. With so many people staying home, **air pollution has gone down significantly**. This makes it **easier for bees to find flowers nearby**, without pollution messing up their ability to detect food.
2. **Fewer bees are getting killed by road vehicles**. Did you know that around **24 billion bees** and wasps are typically killed by vehicles on roads in North America each year?
3. In the United Kingdom, at least, **less work is being done to maintain the strips of grass and plants by roadsides**. This is leading to an **increased area of flowers and lush habitats**, potentially providing more resources for bees and other pollinators.

Of course, for these positive impacts to last, we need to make sure to keep protecting nature beyond the lockdown.

(Source: www.bbc.com/future/article/20200506-why-lockdown-is-helping-bees?ocid=ww.social.link.email)

BEES GET ALL THE ATTENTION BUT OTHER POLLINATORS ARE ALSO IN TROUBLE!



- ✱ A recent study found that fruit and seed production drops an average **63%** when vertebrates, but not insects, are kept away from plants.
- ✱ Birds are the largest group of vertebrate pollinators, with more than **920** species known to pollinate plants across the globe.
- ✱ The International Union for Conservation of Nature (IUCN) lists **24** bat species as critically endangered, **53** species as endangered and **104** species as vulnerable. In fact, did you know bats are among the most endangered of the world's creatures, mainly because much of their habitat has been eliminated by human development? Bats pollinate about **528** plant species worldwide.
- ✱ The monarch butterfly has declined by approximately **90%** since the 1990s. Monarchs face habitat loss and fragmentation in the United States of America and Mexico.
- ✱ Overall, pollinating bird and mammal species are deteriorating in status, with more species moving toward extinction than away from it.
- ✱ Moths, which are important night pollinators are on the decline, **51** species of moths and butterflies are classified as endangered.





C.2 LIFE WITHOUT POLLINATORS

*Imagine life without chocolate! Berries!
Almonds! Apples! Avocados!*

Pick any plant-derived food you like and chances are it depends on pollinators to improve its quantity and quality. But it's not just about delicious food. Losing these nectar-loving creatures will seriously hinder our chances of achieving the SDGs, and makes the world look like a pretty bleak place.



Malnutrition. Scientists believe that the continued loss of pollinators could hurt the nutritional health of millions of people in the developing world, where people's diets tend to rely heavily on the foods pollinated by pollinators.

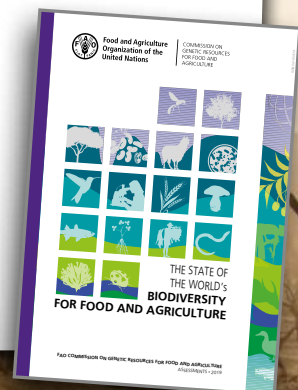
Income loss. Pollinator decline could mean that farmers around the world producing pollinator-dependent crops might lose income. It will also affect the many beekeepers providing pollination services to commercial farmers. Not to mention the fact that the work of pollinators generates billions of dollars annually.

Reduced quality of life. Without pollinators we will also lose many plant-derived products, such as medicines, fibres and oils.

Ecosystem damage. By no longer helping plants to reproduce, pollinator extinction will damage entire ecosystems. Many species of plants will disappear, which means habitat loss for many creatures. Fewer plants also could lead to increased soil erosion and reduced carbon storage, which will affect all of us.

Crops at least partially pollinated by animals account for 35 percent of global food production – by volume, supporting the production of 87 of the leading food crop types worldwide and are particularly significant in the supply of micronutrients for human consumption. For example, they account for more than 90 percent of available vitamin C and more than 70 percent of available vitamin A. Learn more in *The State of the World's Biodiversity for Food and Agriculture*

(Source: <https://doi.org/10.4060/CA3129EN>)



BACKGROUND INFORMATION



D

TAKE ACTION



POLLINATORS

A

IMPORTANCE

B

CONCERN

C

All animals, birds, insects, plants and other life on Earth have a basic right to exist – including **pollinators**; therefore, we should protect pollinators and prevent them from disappearing.

The fact that pollinators are in trouble is sad, but it's not too late to turn things around. The international community recognizes the importance of pollinators and is taking many steps to save them. And there is also a lot each and every one of us can do in our daily lives. In this section, we're going to learn about what's getting done – and what more can be done – to safeguard pollinators.

D.1 PROTECTING POLLINATORS AROUND THE WORLD

International reports by scientists are focusing on pollinators. Leaders of high-level organizations are urging everyone to help. Governments, policy-makers, celebrities, and experts alike are championing the cause. Even though most pollinators are tiny – they certainly manage to make a big statement on the world stage! Let's learn more about what's being done in their name.

What do pollinators and the country of Slovenia have in common?



Did you know that 20 May is World Bee Day? It's a day to celebrate and appreciate bees and ramp up our efforts to save them. We have the country of Slovenia and many others to thank for this. Why? Well, Slovenia has a long history of **beekeeping**. For World Bee Day, it chose the birthday of a great Slovenian bee expert from the eighteenth century – Anton Janša. One in 200 Slovenians keeps bees, and Slovenia was also the first EU Member State to introduce legal protection of bees.

Learn more about Slovenia's longstanding love of bees:
www.slovenia.info/en/stories/celebrate-world-bee-day-with-us

Problems and solutions to help pollinators



POLLINATOR PROBLEM

POLLINATORS DISAPPEARING

The fact that pollinators are disappearing is scary and needs an urgent response. This response should include:

- * promoting pollinator conservation and diversity;
- * promoting better habitat conservation and sustainable agricultural methods;
- * promoting the safe use of pesticides/**integrated pest management** (IPM)/alternative approaches;
- * tackling the issue of climate change (learn more in the YUNGA Climate Change Challenge Badge: www.fao.org/3/a-i5216e.pdf)



IS ANYONE WORKING ON THIS?

Yes! Many organizations and projects are actively working on these actions, including:

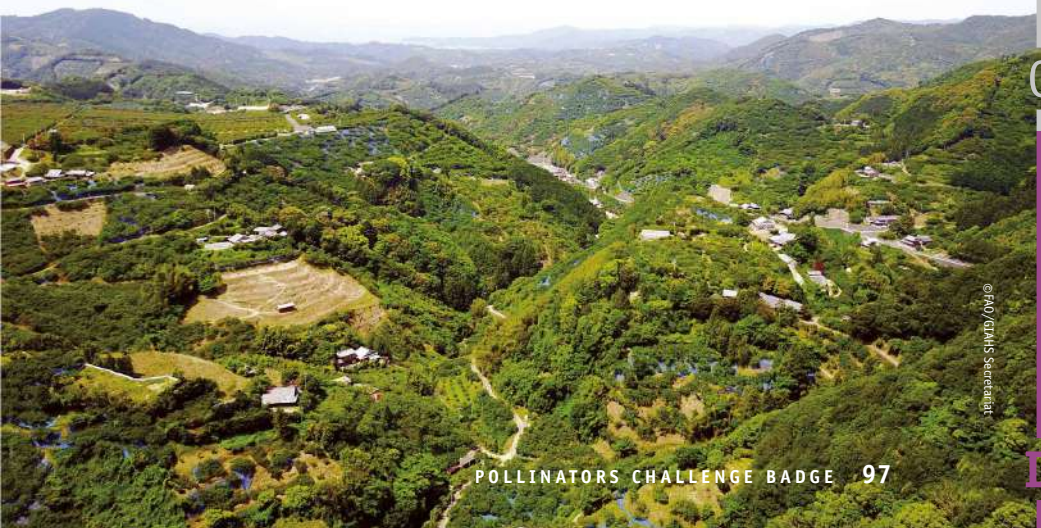
The Food and Agriculture Organization of the United Nations (FAO): helps towards pollinator-friendly practices in agriculture; provides technical assistance to countries. Its Commission on Genetic Resources for Food and Agriculture is the only permanent intergovernmental body that specifically addresses biological diversity for food and agriculture.

The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES): provides governments, the private sector and civil society with scientific and knowledge assessments to help them make informed decisions at the local, national and international levels.

The Convention on Biological Diversity (CBD): promotes policies for the conservation and sustainable use of pollinators; addresses the lack of information on pollinators; supports monitoring and assessment of the status and trends of pollinators; promotes pollinator conservation and diversity.

Apimondia: also known as the International Federation of Beekeepers' Associations; promotes sustainable beekeeping and collaborates with other international organizations in the fight against pesticides, as well as on methods to improve the health and productivity of bees.

The United Nations Educational, Scientific and Cultural Organization (UNESCO): promotes scientific understanding of the key role of pollinators, as well as the need to learn from indigenous and local knowledge about pollination and pollinators.



©FAO/GRiMS Secretariat



POLLINATOR PROBLEM

NOT ENOUGH DATA / INFORMATION

One of the first steps to helping pollinators is by keeping track of their populations and paying attention to how this affects the planet. Steps could include keeping track of:

- * threats to pollinators;
- * pollinator decline (including baseline numbers of pollinators, which aren't even available in many parts of the world);
- * impacts on economies and livelihoods;
- * impacts on ecosystems.



IS ANYONE WORKING ON THIS?

Yes! Here are several cool projects that are tracking the status of pollinators:

- * **SUPER-B** – Sustainable Pollination in Europe
- * **COLOSS** – Prevention of Honey Bee COlony LOSSes
- * **EU Bee Partnership**
- * **PoshBee** – Pan-European Assessment, Monitoring and Mitigation of Stressors on the Health of Bees
- * **EU Pollinator Monitoring Scheme**
- * **EU Pollinator Information Hive - EC Public Wiki** (europa.eu)

HIGH-TECH BEES

Scientists are looking into the possibility of robot bees: insect-sized drones that can carry out artificial pollination. Cool as this might sound, here's hoping bees stick around forever and we won't need to send in the robots after all...

POLLINATOR PROBLEM


NOT ENOUGH KNOWN ABOUT HOW FARMING CAN HELP

Safe and sustainable methods in farming can help pollinators a lot by protecting the environments in which they live. Such practices include planting hedgerows with native flowering plants, not using or reducing the use of pesticides, increasing crop diversity, increasing landscape connectivity, and minimal tilling so as not to disrupt nesting sites. We aim to raise awareness and help our farmers and let them know what their options are. Addressing this could include:

- * training farmers on how to practise **sustainable agriculture**, which creates healthy ecosystems and protects biodiversity;
- * training farmers specifically on how to protect and promote pollinators.


IS ANYONE WORKING ON THIS?

Yes! Organizations such as FAO are helping farmers understand how to make their farms more pollinator-friendly.





POLLINATOR PROBLEM

NOT ENOUGH POLLINATOR-FRIENDLY POLICIES

Strong regulations are needed that can safeguard pollinators, for example by promoting safe pest control and limiting the use of pesticides.



IS ANYONE WORKING ON THIS?

Yes! Organizations such as FAO, IPBES and the CBD are providing evidence from many knowledge systems and key findings on pollinators to help change policy in order to help our helpful friends.

Experts have put together a “Roadmap to Insect Recovery” that calls for the world to “eradicate pesticide use, prioritise nature-based farming methods and urgently reduce water, light and noise pollution to save plummeting insect populations”.

Learn more: www.nature.com/articles/s41559-019-1079-8

Several countries have recently established insect and pollinators protection programmes that include leaving strips of flowers in fields, which increases habitat diversity as well as nesting and foraging resources for pollinators.



GOOD NEWS FOR EUROPEAN POLLINATORS

On 1 June 2018, the European Commission adopted a Communication on an EU Initiative on pollinators. The Initiative sets strategic objectives and a set of actions to be taken by the EU and its Member States to address the decline of pollinators in the EU and to contribute to global conservation efforts. It promotes an integrated approach to the problem and a more effective use of existing tools and policies. The initiative focuses on three priorities:

- * improving knowledge of pollinator decline, its causes and consequences;
 - * tackling the causes of pollinator decline;
 - * raising awareness, engaging society-at-large and promoting collaboration.
- ➔ Learn more at: ec.europa.eu/environment/nature/conservation/species/pollinators/index_en.htm

DID YOU KNOW?

There is an International Pollinator Initiative that aims to promote coordinated worldwide action to monitor pollinator decline, identify practices, and help conserve and manage pollination services for sustainable agriculture. The Initiative's work also aims to improve food security, nutrition and livelihoods through better conservation, restoration and **sustainable** use of pollinators.

POLLINATOR PROBLEM

**NOT ENOUGH BEEKEEPING IN COUNTRIES WHERE HONEYBEES ARE NATIVE SPECIES**

While this activity specifically targets honey bees it's nevertheless a very important one. Beekeeping protects and promotes honey-bee populations, contributing to overall pollination services. But when honey bees are not naturally abundant in an area, it's important to remember they can pose a threat to wild native pollinators.

Promoting beekeeping involves:

- * introducing technology into beekeeping and pollinators' work;
- * promoting urban and peri-urban beekeeping at a micro scale;
- * promoting beekeeping in schools and rural communities.

**IS ANYONE WORKING ON THIS?**

Yes! Organizations such as Apimondia provide information and training to help make beekeeping more accessible to all, as well as sustainable. Most countries and regions also have their own local organizations to support **beekeepers**. Many cities and municipalities around the world promote honeybee havens, which means they are committed to creating the environmental conditions that will promote honey-bee populations and help them thrive. Overall, the aim is not to increase beekeeping per se, but to maintain a high beekeeping capacity for generating income and ensuring pollination services.

D.2 YOU CAN MAKE A DIFFERENCE

It's time to take action to help the bees and other pollinators, there is a lot you can do from living greener lifestyles to taking civic actions. You can promote World Bee Day and advocate in your community and schools all the way to the national level.

Everyday ideas for Happy Pollinators

GOOD GARDENING

Simple changes in our own backyards, schoolyards or even on balconies can have benefits for birds, butterflies, bees, lizards and other pollinators. Check out the box below for ideas.

BEES DON'T GO...

With so many pollinator habitats and lifestyles being disrupted, it would be a nice gesture to make our own home, school, community gardens or even empty lots more hospitable for them. Live in a highly urban area? No problem. Pollinators will still come, if we:

- * **Provide a water source.** Everyone needs water. Setting up a shallow bird bath, and adding rocks for bees and other insects to land on, is a great way to quench pollinator thirst.
- * **Diversify our gardens.** Pollinators love a wide variety of flowers to visit. Check out what is local and native in your area and try planting these in your garden!
- * **Keep them blooming all year long.** It's important to make sure gardens are blooming during each season, all year around, so pollinators have a year-round supply of pollen. Try to include flowers of different shapes and sizes. And remember that some modern gardens where large areas are covered with different coloured stones are not pollinator friendly.



- * **Plant milkweed.** It's a big draw for monarch butterfly caterpillars, which, of course, grow up to be important pollinators.
- * **Leave some ground bare or provide shelter.** Most bees don't live in hives – in fact, many dig nests in the ground to raise their young, but they can't do this if things like mulch are in the way. Many pollinators also like to hide in stems, reeds, bushes or long grass. You can also build a bee hotel (see page 117).
- * **Copy nature.** Arranging plants in groups of three or five mimics nature's planting style. This helps pollinators – many of whom are near-sighted – spot the flowers.
- * **Grow your grass longer.** Here's a great way to get out of lawn-mowing duty. Tell your parents that “according to researchers, the abundance of bees was greatest when homeowners mowed every 2 weeks” (Source: www.sciencedaily.com/releases/2018/03/180313134000.htm).



ENSURING A NATIVE WELCOME

One of the best ways to make pollinators feel welcome in your garden is by planting lots and lots of native flowering plants. Why do pollinators prefer native plants? Well, they grew up together! According to the United States of America Department of Agriculture: “pollinators have evolved with native plants, which are best adapted to the local growing season, climate, and soils”. In fact, most pollinators have a favourite plant species that they have **evolved** to feed from. For example, hummingbirds sip nectar from long, tubular honeysuckle flowers, while the lesser long-nosed bat is highly specialized for nectar-feeding from cactus flowers.

All right, but how to find out which plants are native to your area? Here are a few tips:

- * Do a simple Internet search.
- * Contact your country’s or region’s national botanical or wildlife agency. For example, in the United Kingdom, the Royal Horticultural Society is placing logos on seed packets for plants that are pollinator-friendly and also provides a lot of information on its website: www.rhs.org.uk/science/conservation-biodiversity/wildlife/plants-for-pollinators
- * Ask at a local botanical garden, nursery or garden centre.
- * Ask a librarian to help you look it up.
- * Ask a gardener at your school, home or in your community.

Feel free to plant native species – have fun with your flower beds! As long as your garden is colourful and thriving, pollinators are sure to be pleased!

AVOIDING PESTICIDES

This is another very important way to keep our local pollinators healthy and happy. There are many ways we can achieve this. See the box for ideas.

PLEASE STAY – WE WON'T SPRAY!

Pesticides – including insecticides and fungicides – are tough on pollinators, but pests are tough on our plants. So what to do? Are you aware of how pests are being managed in your home or school garden? Talk to whoever is in charge and discuss ways to address pests without harming pollinators.

One option is to avoid harmful pesticides entirely and only stave pests off with non-toxic substances. This Web site lists which pesticides are safe for pollinators and which ones are not:

www.perfectbee.com/blog/bees-and-pesticides-what-is-safe

If you must use pesticides, here are a few tips to keep in mind:

- * Do so in calm windless weather.
- * Apply only to the specific areas needing treatment.
- * Apply early morning, late evening or night when bees are in their hives or nests and not actively foraging.
- * Avoid applying any pesticides during the time when plants (e.g. heather, lavender and roses) are blooming as this attracts bees and other beneficial insects.
- * Apply pesticides only after flower petals have fallen, when ornamental plants are less attractive to bees.



Integrated pest management (IPM) sounds fancy, but you can do it, too!

- * Where possible, avoid pest problems in the first place by getting rid of old plants that have been infested, and growing plants that are resistant to disease and pests.
- * Carefully study your pest problem and, before you apply a pesticide, make sure the pest population has reached a level where control is necessary.
- * Carefully look into your pest control options, and try to use a combination of pest control techniques – these could include introducing helpful insects, removing pests manually, setting traps, a pesticide, etc.
- * Plant native flowering plant species to support pollinators, choosing species that are naturally resistant to pests.
- * If your garden is large, alternate rows of different kinds of plants. Pests that prefer one type (tomatoes, for example) may not spread to every one of your tomato plants if other vegetables they don't like are planted in between.
- * Avoid planting the same crop in the same spot year after year.
- * Make sure your garden plot has good drainage.
- * Many native pollinators live in natural areas and play an essential role in pollination. Be especially careful when trying to control pests in or near these areas. For example, all butterflies start life as caterpillars, feeding on plants. Learn what type of insect is eating your plants before you inadvertently kill butterflies and other beautiful and beneficial insects. (Source: www.pollinator.org/learning-center/pesticides)
- * In an orchard, get rid of unwanted weeds by mowing, not by using herbicides.

#HUMBLEBRAG

Many gardeners don't think much of dandelions (no matter how much fun it is to blow the seeds off them) or weeds. But many types of weeds and dandelions have a pretty big fan following, namely a wide range of pollinators, including bees, butterflies and hover flies. The humble dandelion supplies a little bit of nectar (10–20 kg/ha) and a huge quantity of pollen (260 kg/ha) for hungry pollinators for a long period, despite the fact that it does not rely on insects to be pollinated! (*Source: www.buzzaboutbees.net/Bees-Love-Dandelions.html*)

Another great reason to get out of weed-plucking duty: tell your parents you're helping pollinators by leaving your garden a little bit wild...



©Unsplash

LIVING GREENER

By taking steps to protect the environment around us, we help promote healthy ecosystems and we reduce our carbon footprints. This will help the pollinators around us be happy and thrive. A few steps all of us can take:

- ✱ Walk or bike instead of driving.
- ✱ Unplug appliances and turn off lights when they're not in use.
- ✱ Avoid wasting water.
- ✱ Reduce our overall consumption, especially of items with a lot of unnecessary packaging.
- ✱ Plant a tree (native tree species).
- ✱ Cut down red meat consumption or eat more sustainable meat.
- ✱ Reduce, reuse and recycle as far as possible.

➔ Get ideas on how to implement these ideas and more at:
www.un.org/sustainabledevelopment/takeaction.

SHOPPING SMARTER

We have a lot of power to create change by simply shopping more carefully. Here are a few examples:

Buying organic. By avoiding pesticides, organic farming nurtures healthy pollinator populations. Buying food grown under organic farming techniques reduces the demand for crops grown with the use of pesticides and synthetic fertilizers. Many grocery stores and farmers' markets offer the option to buy organically-grown foods and produce. Ask the sellers to make sure.

In addition to steering clear of pesticides, organic farming also helps the environment by improving soil quality, reducing soil erosion, supporting water conservation and encouraging biodiversity. All of this helps create a healthier ecosystem and, therefore, happier pollinators.

Certification schemes. Many products now come with certifications, highlighting the fact that they were produced under environmentally-friendly conditions. Find out which of these are available in your area. Some well-known certifications to look out for are Bee Better (beebettercertified.org), Forest Stewardship Council (<https://fsc.org/en>), Fair Trade (www.fairtradecertified.org), Rainforest Alliance (www.rainforest-alliance.org/faqs/what-does-rainforest-alliance-certified-mean) and Energy Star (www.energystar.gov).

Buy locally-produced bee products. Many local smallholder farmers and forest communities maintain sustainable beekeeping practices. You can lend support by buying honey, beeswax or other bee products, directly from them. (Source: FAO)



© Unsplash

GETTING TO KNOW OUR NEIGHBOURHOOD POLLINATORS

How can we help them if we don't know who they are? This step could involve conducting a pollinator survey or contacting local wildlife experts (entomologists) to get the scoop.

How to conduct a pollinator survey

Want to get scientific about your local pollinators? You can create a map or do a survey to better observe them.

1. Go to the garden or outdoor location you want to study.
2. Mark a starting point, measure 50 metre line (or 160 feet) and mark the end point.
3. Survey a 2 metre (or 6 foot) width along this line, walking at an even pace for 15 minutes from beginning to end.
4. Identify and count insects, birds or other animals foraging on flowers and record your observations. Here you will find some usual suspects you may encounter:
www.naturekidsbc.ca/wp-content/uploads/2018/04/Life-in-the-Flowers-Card-Final_-Web.pdf
5. Identify the plants within the same area. How many flowers are on each plant? Record your observations.

(Adapted from: <https://w3.biosci.utexas.edu/jha/wp-content/uploads//Pollinator-Habitat-Surveys.pdf>)



People for pollinators!

We've looked into steps that all of us can take in our daily lives. Now it's time to see what we can do on a bigger scale by taking civic action in our towns and communities. By joining forces and aiming big, we can make a huge difference to pollinators.

CREATING URBAN HAVENS FOR POLLINATORS

Cities can provide great pollinator hangouts. People's gardens, empty and abandoned lots, balconies and even just weedy spots here and there can all be inviting spots for them. Many communities in different countries are joining forces to ensure such "havens" or refuges exist for pollinators in their cities, and provide them access to fresh water, plenty of food and nesting sites. They are also ensuring pesticide-free zones for them.

This involves: forming a group and working with local municipalities to help create environments that are friendly to pollinators. Get inspired and find examples at: www.beethechange.life/bee-haven-principles and millionpollinatorgardens.org/about. And here is a cool example of how to design a space where people and pollinators can just chill together: www.reckless-gardener.co.uk/bee-friendly-garden-at-rhs-hampton-court

CITIZEN SCIENCE

Joining citizen science projects like Bumble Bee Watch (www.bumblebeewatch.org), the Great Sunflower Project (www.greatsunflower.org), Monarch Watch (www.monarchwatch.org), INSIGNIA (www.insignia-bee.eu) and Pollinator Live (pollinatorlive.pwnet.org/teacher/citizen.php). Joining a citizen science project is a great way to get involved and learn more, while spreading the word about pollinators. Nothing going on in your area? Why not launch it yourself? Learn more in **Activity Sheet 9** on page 134.

DEMANDING CHANGE

Most places have local environmental authorities that create local regulations and policies related to the environment. As citizens, we all have the right to connect with these authorities to learn what they are doing towards protecting pollinators. We also have the right to demand that they do more, if it seems they aren't doing enough.

Hey, if Greta Thunberg can get all the way to the G20, what's stopping the rest of us from making our voices heard too?

Let's take inspiration from bees, **work together to form a rock-solid colony and create a real buzz!**



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HERE ARE SOME TIPS FOR MAKING EFFECTIVE DEMANDS:

BE SPECIFIC

Ask your local authority for specific, doable changes, such as:

- * banning certain insecticides;
- * organizing a campaign for pollinators;
- * placing signs next to plants that are good for pollinators, so people are encouraged to grow these (see this initiative by the United Kingdom's Royal Horticultural Society: www.tclgrp.co.uk/plantscape/news/plantscapes-bee-friendly-range-to-be-available-for-towns-and-bids-from-2020).

BE HEARD

Tap into the hive mind by joining forces with friends, family and your local community to make some noise for pollinators.

- * Connect with your local authorities to help them develop local or national plans to protect pollinators.
- * Work with local authorities to launch a campaign to raise awareness on pollinators.
- * Spread the word through social media.
- * Organize a community event. For example, you could join or host World Bee Day celebrations, observed on 20 May each year.
- * Work with a local plant nursery or garden centre to hold a training session on how people can make their gardens more pollinator-friendly.
- * Work with a local organic farms and farmers to hold an event on pollinator-friendly pesticide techniques.
- * Invite local beekeepers to organize an introduction to beekeeping event.

“Never underestimate the power of a small group of committed people to change the world. In fact, it is the only thing that ever has.”

Margaret Mead



ENGAGING WITH YOUR LOCAL ENVIRONMENT AGENCY

This can take the form of a polite letter or going in person to their office after making an appointment. Express your concern about pollinators in your community, municipal/city or region. Some of your questions could include:

- * Are they aware of which pollinator species are local to your area?
- * Do these pollinator species face any risks?
- * If yes, what are these risks?
- * What steps are they taking to reduce these risks and protect pollinators?
- * Make suggestions such as asking them to ensure more native flowers in local gardens and parks and to ban the use of pesticides during flowering seasons.
- * Ask for their support in helping to organize a local awareness campaign.

IN YOUR NECK OF THE WOODS...

Do you live in an agricultural region? Are you aware of what kinds of agricultural practices are followed? Contact your local agricultural authority to find out:

- * How do large crop farms help protect the surrounding ecosystem, including natural resources such as water and soil?
- * How do they benefit from and help protect pollinators?
- * How do they manage pests?
- * How do they help promote species diversity?

Do you live in a city? What does your city government do to help promote and nurture native pollinators? Are there any “bee haven” initiatives where you live?

- ➔ For tips and ideas on how to launch this, visit:
www.honeybeehaven.org/resource/create-a-community-bee-haven



BUILDING A BEE HOTEL

Create a buzzing hangout!

We tend to imagine bees living in hives with entire colonies of bees, but did you know most bees are solitary, and live in individual tunnels, stems or hollow tubes that they make in the soil or in tree trunks? You can invite these loners to your garden by building them a nice bee hotel. Bee hotels are great places for solitary cavity-nesting bees to make their nests. Note that while solitary bees are much less likely to sting than honeybees (because they aren't defending a hive), they still do sting, and caution is always necessary when working with bees. You may need the help of an adult to build your bee hotel.

You will need:

- ✓ A waterproof container, such as a milk carton, bucket, pipe or old crate.
- ✓ Wood blocks or logs.
- ✓ Straws or natural stalks, such as bamboo.

How to make it:

1. Drill holes into wood blocks, ranging from 0.25, 0.3, 0.43, 0.45 or 0.6 cm in diameter (7/64, 1/8, 11/64, 3/16 or 1/4 inches). Use 15 or 30 cm (6 or 12 inch) long drill bits if possible.
2. Insert wood blocks into the container. Add straws or natural stalks, such as bamboo.
3. Hang your bee hotel outside, facing south or southeast.
4. Watch your bee hotel for bees!

[From: Bee and Pollinator Activities for Kids]



- ➔ For additional ideas on creating a bee hotel, visit:
www.nationalgeographic.org/media/build-your-own-bee-hotel
 or www.wildlifetrusts.org/actions/how-make-bee-hotel
 or watch this video: youtu.be/LS_5rntNexo

Some additional tips:

- * For paper nesting tubes, it is important that the nests stay dry as moisture promotes mould growth, which can be harmful for nest occupants. Bee homes should be built in a way to minimize rain getting into the nesting tubes, and they should be cleaned each year to prevent mould build-up, and to prevent the likelihood of pathogen build-up. When appropriate, fresh paper tubes should be used each year. (Source: FAO)
- * In order to ensure that ground-nesting bees come to your garden, there should be spots of soil that are not disturbed by you or any animals, so that the bees can create their own territory, and year after year the nests will increase.

Solitary bee ground nests



©Fani Hatjina



©Fani Hatjina

CREATING FUNKY FLOWER BEDS AND VEGETABLE GARDENS

You will need:

- ✓ A spot that is ready for your garden
- ✓ Paper and pen for writing out your plan
- ✓ Gardening tools (a small spade, hoe)
- ✓ String for measuring
- ✓ Starter plants (tomatoes, peppers, etc.)
- ✓ Seeds (flowers, squash, pumpkins, watermelon)
- ✓ Watering can or hose
- ✓ Plant food (optional)

1. Start with a bit of planning

Once you figure out what you want to plant, map out where you're going to plant it. Some plants (courgettes/zucchini and pumpkins) need room to spread out, others grow upwards (corn and potato), while some (carrots and beets) are mostly underground. Draw a scale map of your yard and then add how and where you're going to plant your garden.

If possible, plant the garden near a water source. This way you may either use a hose to water or at least you won't have to walk as far with a watering can.



2. Get your plants

You can get seeds from garden centres and nurseries, and even most hardware stores. You can also get “starter” plants. These are plants that are already growing, and you simply plant them in the ground. You can find these at greenhouses, farmers’ markets, nurseries and large home-improvement stores.

3. Get planting

First, prepare the soil by adding some organic matter such as compost, fallen leaves or manure. Use a garden fork to mix the material into top 10–15 cm (4–6 inches) of soil. Then use your plan to lay out the garden and plant the seeds in their allocated spots. Read the instructions for each type of plant to determine how deep the seed should be planted.

GARDENING WHEN YOU DON'T HAVE A GARDEN

If you live in the city or an apartment building, it might be a little trickier for you to plant a garden, but it can still be done. Here are a few options:

- ✱ See if friends who have some land would like to start a garden with your family. Two families working on a garden means half the responsibility and twice the fun!
- ✱ Ask a family member who lives out of the city if you can borrow some of their yard for your garden. You can thank them in fresh fruits and vegetables.
- ✱ Start a community garden in your town. Bring together several families who are in the same situation. Share the land and the responsibilities. Note: make sure the place you choose is close by, since you will need to go to the garden at least 2 or 3 times a week.

Source: www.mykidsadventures.com/kids-gardening



4. Care for your garden

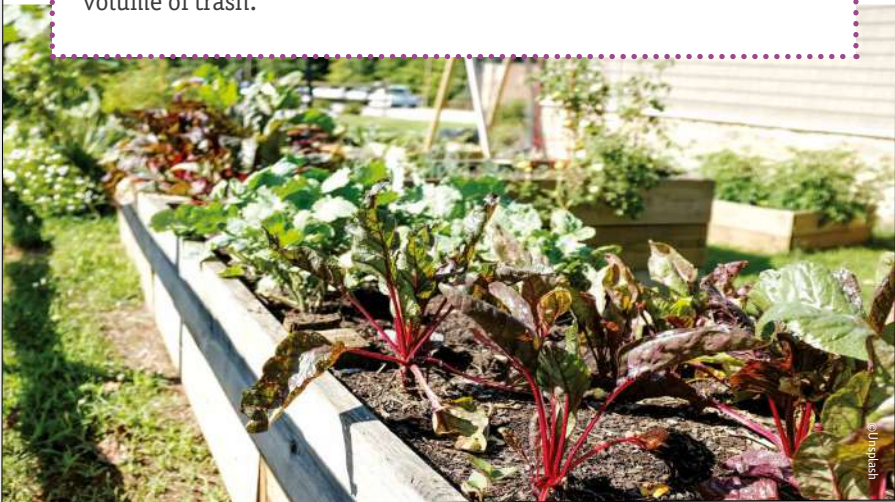
If it doesn't rain regularly, make sure you water your plants to keep them alive and happy.

5. Enjoy, and get to know your local pollinators

As your flowers bloom, your garden is sure to receive a lot of pollinating visitors! Try to observe which your local pollinating species are. Take pictures and keep records!

MAKING COMPOST

Composting is a great way to use left-over food and garden waste to add more nutrients to your soil. **Compost** can be made by combining **biodegradable** materials such as weeds and old plants from the garden with vegetable peelings and fruit cores from your kitchen. After the collected material has been decomposed by the bacteria and other organisms feeding on it, you can add it to your soil. It makes the soil healthier, and helps some plants resist common diseases. It also helps the soil stay moist. By composting, you improve your garden's health, and reduce your waste and your volume of trash.



ACTIVITY SHEET 3

SELECTING AND GROWING FRUIT TREES AND SHRUBS

So, you want to grow your own fruit trees? Good news: pollinators will do most of the work for you! But you need to keep a few things in mind to help the pollinators help you...

Every type of fruit tree has distinct requirements for pollination. Here are some of the basics for most:

- * Some trees can pollinate and bear fruit all by themselves, called self-pollinating or self-fruitful. Others rely mainly on insect and animal pollination. Here are a few examples of who pollinates what in different climates around the world:
 - * **Temperate fruit trees:** Most apple, plum, sweet cherry and pear trees need pollen of a different but compatible variety in order to bear fruit. In addition, these fruit trees have to blossom at about the same time (mid-season, late-season) for pollinators to cross-pollinate them.
 - * **Tropical fruit trees:** Guava trees and passion fruit plants mainly rely on honeybees for their pollination. Pineapple plants mostly rely on hummingbirds.
 - * **Subtropical fruit trees:** Most citrus fruit trees, including oranges, kumquats, lemons and limes are self-fruitful, meaning they can bear fruit through self-pollination but are benefited by insect pollinators. As for avocados, in Central America it's social bees and wasps who do the pollinating; in parts of Australia, hover flies do the pollination and finally, bats (as well as flies, honeybees and wasps) are also known to pollinate avocados.
- * It is a good idea to pollinate fruit trees of the same genus – but different varieties (apples with apples, pears with pears).



- * Plant at least two compatible-pollen varieties within 15 metres (50 feet) of one another – this is the ideal distance that makes it likely a pollinator bee will make the trip from tree to tree.
- * Pollination happens when the trees blossom.
- * Pollen must be transferred from the male to the female part of the plant. Incomplete pollination results in only flowers but no fruit. That's when you know it's time to invite more pollinators to your garden.
- * Pollination can be performed by birds, bats, other mammals, wind or insects. The most common fruit-tree pollinator is the honeybee.

Examples of fruit trees and plants that help each other grow:

- * Pears, crabapple and apples
- * Cherries and plums
- * Grapes and some varieties of blueberries are self-pollinating but growing two or more varieties nearby results in better yields.
- * Gooseberries and some varieties of currants are self-pollinating but growing them near each other results in better yields.



ACTIVITY SHEET 4

MAKING A FLOWERING BALCONY

If you don't have a garden in which to plant flowers, or if you would like to encourage still more pollinators to visit your home or school, another idea is to grow flowers in containers and place them on your balcony, terrace, patio or even rooftop.

You will need:

✓ Large containers to grow flowers in

Use as large a container or containers as possible, to provide room for roots to grow. Make sure there are drainage holes at the bottom of the container for excess water to run off.

✓ A few different types of flowering plants, of different heights, colours and textures

A variety of colours and sizes looks decorative and will also make your display more attractive to a diversity of pollinators. Choose native and local plant varieties that don't spread their roots too far and that do well in dry soils, as containers dry out much more quickly than a garden bed. Bulbs such as crocuses and narcissi, which flower early, followed by lavender, borage, zinnias, asters, daisies, nasturtiums, crocuses and marigolds (*Calendula*), are good choices.

✓ Don't forget the herbs!

Herbs are great for balcony gardening. Many pollinators love the nectar and pollen provided by herbs, plus you can cook with your herbs for more flavourful meals. Some of the herbs that are popular with pollinators include basil, mint, fennel, curry plant, rosemary and thyme.



✓ Soil

This one is kind of obvious. Visit your local nursery or garden to see which options are available for planters and pots. Use an organic soil mix if you can.

✓ Hanging baskets, if available

Placing your flower containers inside hanging baskets is a pretty way to spruce up your porch or balcony.

What to do

Add soil and seeds to your containers (make sure they have drainage holes!), water them regularly and watch your mini garden bloom! And do say hello to the pollinators that stop by.

...Also pay attention to sunlight

Shade-loving plants will get scorched in south- or west-facing placements. Plants that thrive in full sun won't do so well in a northern exposure.

➔ Get more tips and flower suggestions at:
www.almanac.com/content/best-flowers-window-boxes



©Studio Paradeschi

ACTIVITY SHEET 5

CHOOSING POLLINATOR-FRIENDLY FOOD

Go organic and sustainable

Try to buy organic produce to ensure that pesticides (that can also be harmful to you in addition to harming pollinators) weren't used in their production. According to the United States of America Department of Agriculture, crops like corn, wheat, cotton, potatoes and soybeans (that are main staple crops used for livestock feed) accounted for around 80 percent of pesticide use in 2008 in the United States of America. Explore the options in your area to see what organic products are available. If possible, talk to sellers at your local farmers' markets to ask how they grow their products and how they try to help pollinators.

Shop local

Buying locally produced goods is also important. Transporting goods over long distances requires more energy and produces large amounts of greenhouse gases, contributing to climate change.

Sometimes, buying products that are both organic and produced locally will not be possible. In such cases, use your own judgment to decide what seems best. For example, from how far away did this product come? Is there a better alternative you can buy instead? Did you talk with the farmer that produced the food? What practices did he/she use to help the pollinators?





Cut down on packaging

Always choose items with the least packaging. Packaging uses energy in its manufacture and is unnecessary much of the time. Choose loose, fresh fruit and vegetables that are not wrapped in plastic. Bring your own reusable bags!

Cut down on meat

Producing meat such as beef and lamb uses up huge amounts of water and energy. This results in wide-scale damage to ecosystems and habitats, hurting pollinators in the process. Opting for plant-based alternatives to meat will lead to a healthier planet, and happier pollinators.

ACTIVITY SHEET 6

GROWING A MINI WILDFLOWER MEADOW

Do you have a grassy patch to play with? Consider turning it into a wildflower meadow, which pollinators will love to visit. You will need to start by getting rid of the grass. You can do so by smothering it under sheets of material for several weeks.

You will need:

- ✓ Cardboard, plastic, newspaper or weed barrier material to smother and kill the grass
- ✓ Compost
- ✓ Wildflower seeds native to your area
- ✓ Sand to mix with your seeds, to see where you're planting the seeds
- ✓ A rake
- ✓ A watering can

What to do

1. Cover the grass with several layers of newspaper, black plastic or overlapping pieces of cardboard. The goal is to block the light from the grasses and weeds trying to grow underneath.
2. Place a layer of compost over the grass-covering material. This is best done in autumn or early spring. It may take 6– 8 weeks for the grass to die and begin to decompose, depending on the temperature and weather conditions.
3. Remove the cover after 6– 8 weeks. You should have bare soil on which to plant. You can lightly tread over the area to create a settled seedbed but avoid overly disturbing the soil.



4. Mix your wildflower seeds with the sand and sprinkle by hand over the area. The sand allows you to spot where the seeds have landed so you can make sure to spread them evenly.
5. Follow Step 4 with a gentle raking, just enough to settle the seeds.
6. Gently water the seedbed and continue to do so over the first few months.
7. Your wildflower meadow should begin germinating in a week.
8. Pollinators should arrive shortly thereafter.

➔ Learn more:

www.gardenersworld.com/plants/three-ways-to-create-a-mini-meadow



ACTIVITY SHEET 7

SELECTING AND CONSUMING HONEY

How to choose the right honey

1. As far as possible, try to buy honey from your local beekeepers rather than the supermarket. Beekeepers will usually not provide subquality honey, so you'll be more likely to get pure, good quality honey. You'll also support your local economy.
2. Whether buying from the supermarket or local beekeepers, choose honey that is:

Closest to its original form. The best quality honey has not been tampered with, heated or processed. It is honey that has been directly extracted from the beehive without anything else being done to it. It usually appears cloudy and opaque. It contains the naturally occurring healthy nutrients that make honey such a superfood and sometimes is called "raw honey".

Processed honey mostly comes from a commercial supplier. It can be runny or set and is often lighter in colour. By being processed, it has lost the healthy enzymes and vitamins found naturally in honey.

One way to tell the difference is by doing a water test: take a teaspoon of the honey and put in a glass full of water. Subquality honey will dissolve in the water while better quality honey, which is denser, will settle right at the bottom of the glass in lumps.

The great benefit of natural honey is that it contains vitamins, enzymes and pollen. But when honey is pasteurized, all these items get filtered out. So, make sure you choose honey in its most original form when you go honey shopping.



No additives. When buying honey, read the label. Make sure other sugars haven't been added to it. Some unscrupulous mass-producers may add in honey substances such as high-fructose corn syrup.

How to enjoy your honey

When using honey in tea or coffee as a sweetener, you should not add it when the liquid is boiling hot, because then you destroy its beneficial properties. You should wait until the liquid is less than 40 °C (honey should not be heated above 40 °C).

Liquid vs crystallized honey

You might have noticed that over time, golden, liquid honey can separate, with the liquid part on top and a cloudy, clumpy mass below. This means that the honey has crystallized. People often assume when this happens that the honey has gone bad, and even throw it away. The fact is that over time, almost all pure, raw honey crystallizes. It's sort of like water turning into ice, but it contains the same properties and is just as good for you. All honey is liquid when just extracted from a hive, but as time passes it will start to crystallize. Different types of honey will crystallize over different periods – some very soon and some very late, even after two years! Raw honey crystallizes faster than processed honey, since it has never been heated or filtered. Still, you need to watch for the way honey crystallizes. The process should be homogenous, the same everywhere in your bottle.

Never throw crystallized honey away – honey will last for many years if stored in a sealed container.



©Depositphotos/Jianghongyan

ACTIVITY SHEET 8

JOINING A BEEKEEPING CLUB*

Beekeeping is a rewarding activity in so many ways. Here are just a few reasons why:

- * You save money on local, good quality honey.
- * In addition to honey, beekeeping can provide you with other bee products such as beeswax, bee pollen and propolis.
- * Boosts your garden's flowers, fruits and vegetables, thanks to pollination.
- * Not just in your garden but it will help your local environment, through pollination's ecosystem services.
- * Helps conserve bees (i.e., conservation stewardship).
- * Fosters a sense of community through a joint club, cooperatives or online community regarding beekeeping.
- * Beekeeping also can provide some personal benefits such as increasing self-confidence, leadership and environmental appreciation.

Ok, so you're sold. But where to start? Well, instead of going it alone, you could either look into local beekeeping clubs, or place a call for likeminded people to join forces with you.

Step 1: Search for what's out there:

- * Search online for local beekeeping clubs.
- * Contact a local environmental agency for lists of local beekeeping clubs.
- * Visit local farmers' market to speak with honey vendors in case they know of clubs you can join.



* This activity is suitable for older participants, or for younger participants with adult involvement.

Step 2: Get in touch

- * Contact the clubs that look promising and find out if/how you can join.

Step 3: Sign up!

- * If you get a positive response, and it seems feasible to you, what are you waiting for? Get started!

Step 4: If you don't find any local beekeeping clubs...

- * Place an announcement in a local paper, on social media, or on your school or library bulletin board, inviting others to team up with you for a beekeeping club. Make sure you list the benefits, both in terms of harvesting bee products, and helping to protect pollinators.
- * Once you get a few joiners, find a local bee expert who can provide guidance and advice on how to get started. For example, here is a list of 15 essential items for beekeepers: morningchores.com/beekeeping-equipment
- * If you cannot find a local expert to help you, write to international groups such as Apimondia, who can provide you with helpful advice.

DON'T FORGET:
EVEN THOUGH BEES
ARE GOOD FRIENDS
TO US, THEY DO
STING SO ALWAYS
BE CAREFUL AND
TAKE THE NECESSARY
PRECAUTIONS WHEN
DEALING WITH THEM.



©Depositphotos/rieword4555

ACTIVITY SHEET 9

BECOMING A CITIZEN SCIENTIST

Are you interested in the natural world? In finding solutions to problems such as protecting endangered species, improving air and water quality, preventing disease or boosting the health of local ecosystems?

These issues aren't just for scientists and experts to tackle! All of us can get involved. As stated on the scistarter.org website: "People just like you are collecting data by taking photos of clouds or streams, documenting changes in nature, using smartphone sensors to help scientists monitor water and air quality, or playing games to help advance health and medical research. A citizen science project can involve one person or millions of people collaborating towards a common goal. Typically, public involvement is in data collection, analysis, or reporting."

For the purposes of this Badge, we're focusing on projects that will help protect pollinators.

Step 1. Find a project you'd like to join

Here are some suggestions:

The X-Polli: Nation Project: This National Geographic project shares (or 'cross-pollinates') approaches and tools between members of the public, scientists, technologists and educators in order to support pollinators, people and the practice of citizen science.

www.opalexplornature.org/xpollination

BeeWise Honey Bee Pollen & Nectar Map: Use the iNaturalist application to participate in mapping pollen and nectar sources for honeybees anywhere in the world. Take pictures of honeybees pollinating, count bees and blossoms and map GIS location, temperature and date.

www.inaturalist.org/projects/beewise-honey-bee-pollen-nectar-map



Pollen Nation: Citizen scientists can collect a pollen sample in their own backyard and upload the data to the pollen map using the Pollen Nation app.

citizensciencehd.com/pollen-nation

Step 2. Start your own citizen science group

If you don't find an existing project that works for you, or you'd rather start your own thing, then gather your forces and start your own citizen science campaign in your area. Here are some suggestions for what you can study:

- ✦ Which species are your local pollinators?
- ✦ Do they face any threats? If so, what are they?
- ✦ Are their numbers on the decline or are they doing fine?

You may start by enlisting the help of local wildlife experts and environmental agencies.

Step 3. Share your findings

Decide with the group how you'd like to share your data and your findings. This could feed into a major campaign, where you raise awareness about the plight of your local pollinators and foster activism around helping to protect them.

Let's do
something for
POLLINATORS!

SECTION A:

WHAT IS A POLLINATOR?

DO EITHER **A.01** OR **A.02** AND (AT LEAST) ONE OTHER ACTIVITY OF YOUR CHOICE. AFTER COMPLETING OUR **WHAT IS A POLLINATOR?** ACTIVITIES, YOU WILL:

- * **UNDERSTAND** what pollinators are.
- * **LEARN MORE** about the different types of pollinators and how pollination works.

DO ONE OF THE TWO COMPULSORY ACTIVITIES BELOW:

A.01 POLLINATOR SURVEY. Hit the great outdoors, whether in your own backyard, a local park, or your school garden, or community garden. Follow the steps to conduct a pollinator survey on page 111. Identify as many pollinators as you can, whether bees, birds, butterflies, mosquitoes or squirrels. If you see other animals and insects, observe their activities. Do you think they are pollinators? Why? Keep a record of which pollinators you see, which flowers they visit, and how often you see them within a given time period. If you can, take pictures of them; if not, then draw pictures of them. If you don't know the name of the species, try to describe it in as much detail as possible and see if you can identify it with the help of your group or class later. This could be a useful template to base your survey on: www.calacademy.org/sites/default/files/assets/docs/pdf/297_pollinatordatasheet_updated.pdf

Which flowers attract the most pollinators? Talk to your parents, teachers, or school and community gardeners about planting more of those flowers.

LEVEL
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2
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GOAL ALERT

This activity contributes to the SDGs on No Poverty (1), Zero Hunger (2), and Life on Land (15)

A.02 BUILD A BEE HOTEL. Follow the steps in the Activity Sheet on page 117 to build a bee hotel in your home, school or community garden. Then monitor it over the next few days. Is it attracting bees? Can you recognize what types of bees are coming?

LEVEL
3
2
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GOAL ALERT

This activity contributes to the SDGs on No Poverty (1), Zero Hunger (2) and Life on Land (15)

YOUNGER PARTICIPANTS WILL NEED ADULT HELP FOR ACTIVITY A.02



CHOOSE (AT LEAST) ONE ADDITIONAL ACTIVITY FROM THE LIST BELOW:

A.03 DISSECT A FLOWER. Get permission to pluck a few flowers for this activity. Try choosing flowers of different sizes and colors. After you pluck them, gently take them apart and examine the different parts. Compare against the diagram on page 33. Do you recognize the different parts? Where is pollen produced and which part receives pollen to produce seeds?

LEVEL 1

A.04 BEE A POLLINATOR. Follow the instructions on page 47 to perform a bit of pollination yourself. Voilà! You can now pronounce yourself an official pollinator! You can have a bit of fun with this by cross-pollinating the same type of flower but with different colours and wait and see the result. Have you heard of a famous scientist named Mendel? He crossed different kinds of pea plants – for example he crossed a tall pea plant with a short one. What do you think he ended up with? If you guessed medium, well so did Mendel – but both of you were wrong! In fact, he got tall pea plants because that was the dominant trait. Now make like Mendel and do some experimenting in your own garden! Note how long it takes you to do about 20 pollinating trips. Does it help you appreciate the hard work of pollinators?

LEVEL 2



GOAL ALERT

This activity contributes to the SDGs on **No Poverty (1)**, **Zero Hunger (2)** and **Life on Land (15)**

A.05 WHO'S A POLLINATOR? Divide into two teams. Each team makes a list of animals, birds and insects, including both pollinating and non-pollinating species. Then hold a quiz game where each team guesses from the opposing team's list which species is a pollinator and which isn't.

LEVEL
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A.06 BEE FARM VISIT. Visit a local **beekeeping** operation to learn more about their work. What type of bees are they keeping? What does it involve? What are the hardest parts of beekeeping? What is the best part? What are the benefits of beekeeping? What are five new things you learned about bee behaviour? With permission, create a video or podcast of your interview and share it on social media. If you do not have a bee farm in your area, visit a local orchard, farm, or nursery instead and find out how they pollinate their crops and plants.


LEVEL
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A.07 LOCAL SPECIES. Ask around or do some research to determine which the main pollinators are in your region. Pick one species and research it thoroughly to find out all about it. Which flowers does it pollinate? How does it do so? What is its habitat? Create a photo essay on your pollinator for your group or class.

LEVEL
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A.08 ALL ABOUT POLLINATION. Watch a video to learn more about the various steps in pollination. Some options include


LEVEL 3  www.youtube.com/watch?v=SiFaN2xQg5g and

LEVEL 2  www.youtube.com/watch?v=W90iGA5_mVs. Create a presentation, using videos and animation, on the different types of pollination and pollinators. For example, wind and water can be pollinators, too. And some plants can **self-pollinate**. Include an explanation on why cross-pollinated plants tend to be hardier.




A.09 EVOLUTIONARY STUDY. Pollinators prefer the flowers that

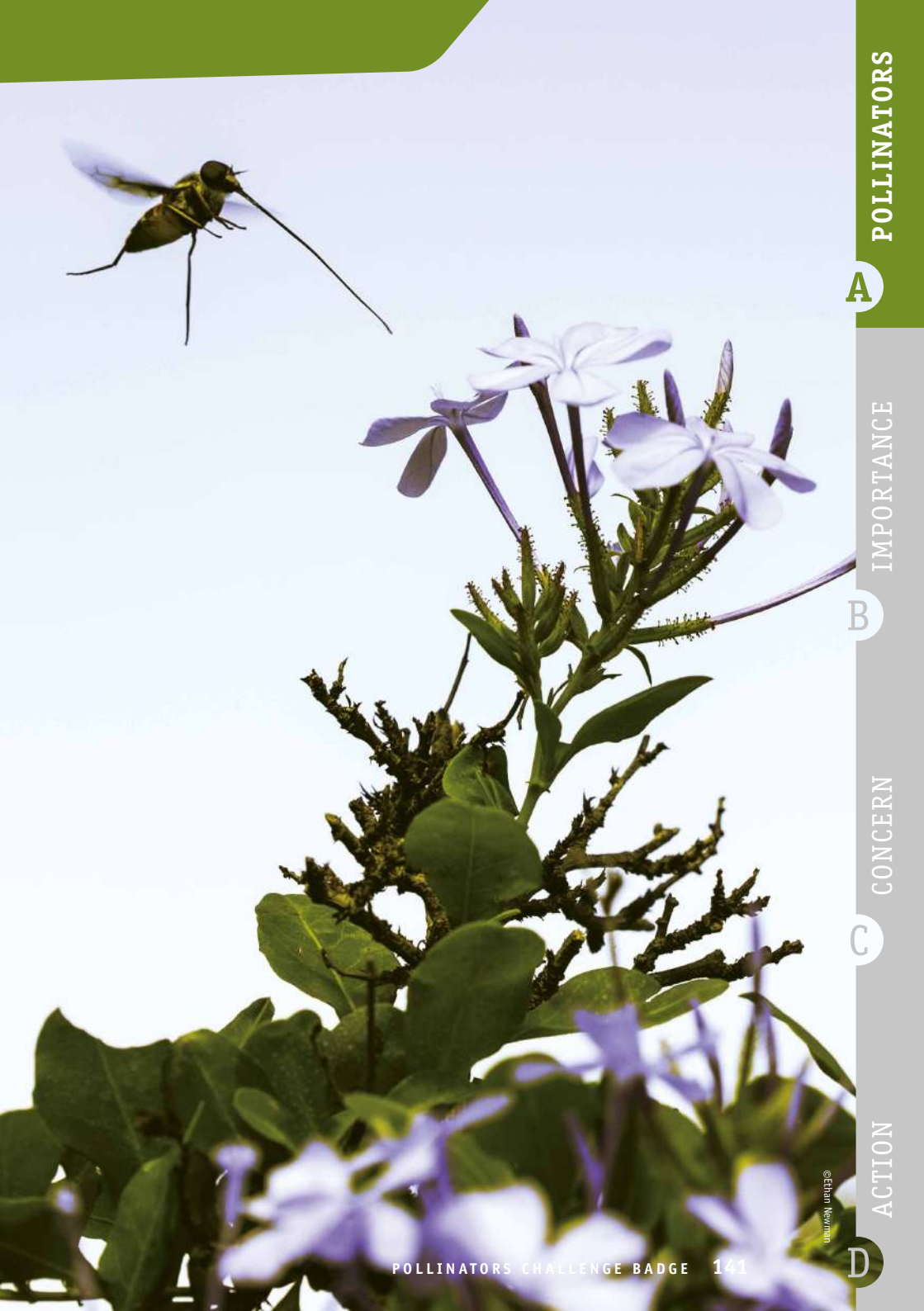
LEVEL 3  are native to their area because they have evolved along with

LEVEL 2  these plants and are best suited to feed from them. Some

LEVEL 1  plants have adapted unique strategies to attract pollinators and ensure pollination, while some pollinators have developed special features to best help them reach the nectar. Conduct an investigation to learn which flowers are native to your area and which pollinators have evolved along with them. How did they evolve to adapt to each other and best help each other?

A.10 Do any other activity approved by your teacher or leader.

LEVEL 1  2  3 



A

IMPORTANCE

B

CONCERN

C

ACTION

D

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SECTION B:

WHY ARE POLLINATORS IMPORTANT?

DO EITHER **B.01** OR **B.02** AND (AT LEAST) ONE OTHER ACTIVITY OF YOUR CHOICE.

AFTER COMPLETING OUR **WHY ARE POLLINATORS IMPORTANT?** ACTIVITIES, YOU WILL BE ABLE TO:

- * **UNDERSTAND** the importance of of pollinators to people and planet.
- * **UNDERSTAND** the range of services that pollinators provide.

DO ONE OF THE TWO COMPULSORY ACTIVITIES BELOW:

B.01 FAVOURITE FRUITS AND VEGETABLES. What are
 LEVEL 3 your five favourite fruits and vegetables? Find out if they
 LEVEL 2 rely on pollinators to grow. Which **pollinators** help these
 LEVEL 1 fruits and veggies, and how? Are these plants in danger of
 disappearing if their pollinators disappear? Prepare a photo
 story about your five favourite fruits and vegetables and
 their relationship with pollinators. Then, find out which of
 them grows in your region. After getting permission, plant
 it in a local park or green space, and monitor it from time
 to time to check if it's doing all right.



GOAL ALERT

This activity contributes to the SDG on **Life on Land (15)**

B.02 SDG HELPERS. Brainstorm as a group to see how many of
 LEVEL 3 the **17 SDGs** are linked to pollinators. Which ones did you
 LEVEL 2 come up with? How do pollinators contribute to achieving
 LEVEL 1 these goals? Create a poster for your school hallway to
 spread the word on how pollinators are helping us achieve
 the SDGs.



GOAL ALERT

This activity contributes to the SDG on **Partnership for the Goals (17)**



CHOOSE (AT LEAST) ONE ADDITIONAL ACTIVITY FROM THE LIST BELOW:

B.03 PETALS AND POLLINATORS. Which is your favourite flower? Do you know which pollinators help it grow? Is it pollinated by more than one animal or insect? Talk to a gardener or plant expert to see if you can find out which pollinators help your favourite flower. Create a record to track which pollinators visit it and how often. You can base it on this template: www.calacademy.org/sites/default/files/assets/docs/pdf/297_pollinatordatasheet_updated.pdf

LEVEL
●
●
①

B.04 FOOD DIARY. Keep track of everything you eat in one day. Then investigate how it was produced. Was it produced by conventional farming? Pollinator-friendly farming? Locally? Or does it depend on pollinators surviving in another part of the world? Find out how many of the foods you eat depend on pollinators for their existence and learn more about how your favourite food is produced.

LEVEL
●
②
①

B.05 LOCAL LANDSCAPE. What kinds of **ecosystems** exist where you live? Is it desertic, or do you have forests or mountains? Do you live in an urban area that has parks or empty lots? Do some research to discover which pollinators rule in your local ecosystems and create a poster on this.

LEVEL
③
②
①

B.06 BOOK REVIEW. Read a book about any pollinator such as *The Flight of the Honey Bee* or *Bat Citizens: Defending the Ninjas of the Night*. Did you learn anything new? What was the most interesting or surprising thing you learned? Present your findings to your class or your family.

LEVEL
③
②
①

- B.07 STUFF WE USE.** Pollinators are hugely important for our food crops, but what about other plant-derived products, such as oils, seeds, nuts, fibres and medicines? Find out which of these products are popular in your area. Does their production depend on pollinators? Are they locally produced? What do people use these products for? Create a presentation or photo story with your findings.

LEVEL
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- B.08 BEE PRODUCTS.** Honey, beeswax, royal jelly, bee pollen, propolis...honeybees provide us with a range of useful products. Pick one that you don't know much about and learn all about it. What is it used for? How and why do bees make it? Try to meet with local producers, who are selling products derived from honeybees. Do their incomes depend on selling these products? What challenges do they face? What would help them in their activities? For example, better regulations against pesticides, or more planting of native flowers? Brainstorm with them about how to promote beekeeping and bee conservation.

LEVEL
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GOAL ALERT

This activity contributes to the SDG on **Decent Work and Economic Growth (8)**

- B.09 POLLINATORS AND THE ECONOMY.** Do some research to determine how much your country's economy depends on pollinators. Does a large part of your country's economy depend on agriculture? What is the role of pollinators in growing these crops? Talk to local agricultural and wildlife experts to determine the role of pollinators in the economy. Refer to the FAO guidelines for help: www.fao.org/3/a-at523e.pdf

LEVEL
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- B.10** Do any other activity approved by your teacher or leader.

LEVEL 1 2 3

SECTION C:

BEE CONCERNED

DO EITHER **C.01** OR **C.02** AND (AT LEAST) ONE OTHER ACTIVITY OF YOUR CHOICE.

AFTER COMPLETING OUR **BEE CONCERNED** ACTIVITIES, YOU WILL BE ABLE TO:

- * **UNDERSTAND** the main threats to pollinators and why this matters.
- * **REALIZE** how we are all responsible for protecting pollinators.

DO ONE OF THE TWO COMPULSORY ACTIVITIES BELOW:

C.01 LOCAL THREATS. What are the threats to your local **pollinators**? Make a list of possible factors. Is there a lot of construction going on? Is there a lot of deforestation for farming purposes? Conduct a community survey to learn what types of pesticides are used the most in your area. Are they harmful to pollinators? What about pollution – is that a problem in your region? Get together as a group to work on the biggest threat to pollinators in your area. If it is pesticide use, how can you share information on alternative practices? (See page 106 of the Badge for ideas). If the problem is too much construction, perhaps you can help pollinators by planting more native plants elsewhere or building bee hotels. Pick a plan with your group and work on it together.

LEVEL
3
2
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GOAL ALERT

This activity contributes to the SDGs on **No Poverty (1)**, **Zero Hunger (2)** and **Life on Land (15)**

C.02 FIELD TRIP. Visit a local farm to learn more about how sustainable agriculture. How does the farm help to protect the overall **ecosystem**? What are the challenges to this kind of agriculture? What are the benefits? Where do pollinators fit in? Find out as much as you can, and prepare a short video feature about your trip. You can also go to your local farmers' market to get to know the producers and see what they are doing for the environment. Share your findings with us **@YUNGA (twitter.com/UN_YUNGA)**

LEVEL
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2
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GOAL ALERT

This activity contributes to the SDGs on **No Poverty (1)**, **Zero Hunger (2)** and **Life on Land (15)**



CHOOSE (AT LEAST) ONE ADDITIONAL ACTIVITY FROM THE LIST BELOW:

C.03 POLLINATOR-FREE FOOD. Create a week's menu for yourself only made up of foods that do not need pollinators to be produced. What does your menu look like? **LEVEL 1** Is it tempting? What would you like to add to it? Which pollinator-derived foods do you miss the most? Then make a menu including your favourite foods that are produced with the help of pollinators. Work with your parents to prepare the meals from this menu in your home. And don't forget to tell your family all about the pollinators, who helped bring this meal to your table!

C.04 HABITATS IN THE WILD. Go for a hike and try to spot pollinator habitats. Do you spot any hives, burrows or nests that could be housing pollinators? Now that you are aware of where they live, how can you be more careful to protect them from now on? One of the best ways to help wildlife is to preserve the environment in which they live. Make a list of five ways you can help protect these creatures and their homes. **LEVEL 1**



GOAL ALERT

This activity contributes to the SDGs on **Life on Land (15)**, **Climate Action (13)** and **Responsible Consumption and Production (12)**

C.05 PAINTING THE BIG PICTURE. It's not just about losing our favourite foods. The world would look like a very different place without pollinators. Make a painting of how the world looks now, thanks to pollinators. Is it full of trees and flowers and buzzing with life? Now paint what the world might look like if pollinators were to disappear. Would we lose many plant species? Would the animals that live in trees and plants lose their homes? What else might happen? Display your two paintings side by side in a prominent place to spread awareness on how our planet depends on pollinators.

LEVEL
3
2
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GOAL ALERT

This activity contributes to the SDG on **Partnership for the Goals (17)**

C.06 WHAT ABOUT THE CLIMATE? Talk to a wide range of people – farmers, beekeepers, community elders, environmentalists, local government officials and wildlife experts – to learn about the impacts of **climate change** where you live. Is climate change noticeable and is it affecting pollinator populations? What do people believe are the main impacts of climate change in your area? Make a brief video story or put together a photo blog with your interviews.

LEVEL
3
2
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C.07 THE NUTRITION FACTOR. The decline of pollinators means a decline in global nutrition. Conduct a study to understand why this is the case. What are the main nutrients that will disappear? Why are they important to our health? What are the main problems that will come from malnutrition? Which parts of the world are likely to suffer the most? Create a presentation or photo story with your findings.

LEVEL
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2
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C.08 UNDERSTANDING PESTICIDES. Neonicotinoids.

LEVEL 3 ● Organochlorines. Carbamates. There are a wide range of
LEVEL 2 ● **pesticides** out there, some toxic to pollinators, others not
 ● as much. Conduct a desk study to learn which are the worst
 offenders. Which pollinators do they harm? What effect
 do they have on pollinators? Then find out which ones
 are used most widely in your area and how they are used.
 Survey local gardeners and farmers to get the answer. If
 the most commonly used pesticides are toxic to pollinators,
 create a presentation on their harmful impacts and include
 suggestions for non-toxic alternatives, or ways to use them
 that cause less harm. Organize an event for local gardeners
 and present your findings.



GOAL ALERT

This activity contributes to the SDGs on **Life on Land (15)**,
Zero Hunger (2) and **Partnership for the Goals (17)**

C.09 2 POLLS. Pollinators and pollution – one bad, one great,

LEVEL 3 ● both linked. What is the air pollution situation in your
 ● region? Invite a local air-quality expert to talk to your school
 ● about this. Is air pollution affecting local wildlife, including
 pollinators? What are the main causes of air pollution?
 What does the expert recommend? Electromagnetic waves,
 for example from overhead power lines, are another factor
 affecting bees. Find out the sources of electromagnetic waves
 in your area and how they might be impacting pollinators.

C.10 Do any other activity approved by your teacher or leader.

LEVEL 1 ● **2** ● **3** ●



A

B

C

D

SECTION D:

TAKE ACTION

DO EITHER **D.01** OR **D.02** AND (AT LEAST) ONE OTHER ACTIVITY OF YOUR CHOICE.

AFTER COMPLETING OUR **TAKE ACTION** ACTIVITIES, YOU WILL:

- * **ORGANIZE** and participate in a community initiative for protecting pollinators.
- * **CONVINCE** other people to join in actions for safeguarding pollinators!

DO ONE OF THE TWO COMPULSORY ACTIVITIES BELOW:

- D.01 CREATE A BUZZ.** Organize an event for World Bee Day (20 May) in your community. Bring tangible ideas and organize demonstrations so people can use these ideas at home. These could include steps for building bee hotels, planting native flowers, using alternatives to pesticides or adding water sources to gardens.

LEVEL
3
2
1



GOAL ALERT

This activity contributes to the SDGs on **No Poverty (1)**, **Zero Hunger (2)** and **Life on Land (15)**

- D.02 GIVE BEES A CHANCE.** Make your home or school garden more pollinator friendly! This will help pollinators find nectar and pollen to feed on all season long. Many flowering trees and shrubs are important sources of food for pollinators early in the season. Try to group each kind of flowering plant into clumps of three or more rather than dotting them individually throughout your garden. This makes it easier for pollinators to locate plants. Add a source of water, and perhaps, build a bee hotel. Leave options for pollinators to hide and nest in leaves, bushes, etc. Find tips at: kidsgardening.org/ten-tips-to-help-pollinators

LEVEL
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GOAL ALERT

This activity contributes to the SDGs on **No Poverty (1)**, **Zero Hunger (2)**, **Life on Land (15)** and **Decent Work and Economic Growth (8)**

CHOOSE (AT LEAST) ONE ADDITIONAL ACTIVITY FROM THE LIST BELOW:

D.03 BEING GOOD FOR GLOBAL GOOD. Talk to your parents about making one lifestyle change at home to help the planet. A healthier planet will help pollinators, too! You could agree to recycle more, drive less or use fewer packaged goods. Create a checklist and keep it in a prominent space at home, to help the whole family stay on track. See the example below for ideas to create your own checklist.

LEVEL 1



GOAL ALERT

This activity contributes to the SDGs on **Life on Land (15)**, **Climate Action (13)** and **Responsible Consumption and Production (12)**



Source: <https://successinacup.wordpress.com/2012/05/17/10-easy-ways-to-save-the-planet>

D.04 A WATERY GIFT. Create a water source for pollinators in your home or school garden. Change the water on a regular basis so that the pollinators have clean water at all times and to avoid creating an insect breeding spot, e.g. for mosquitoes.

LEVEL 1
LEVEL 2
LEVEL 3



GOAL ALERT

This activity contributes to the SDG on **Life on Land (15)**

D.05 PARK SIGNS. By now you know a lot about pollinators, but you can make sure others do, too. Get permission from authorities to create and place signs in a local park. The signs can explain which pollinators tend to live in this area, why they are important and what everyone can do to help. See examples from the Smithsonian National Zoo in Washington, DC, below.

LEVEL 1
LEVEL 2
LEVEL 3



GOAL ALERT

This activity contributes to the SDG on **Partnerships for the Goals (17)**





D.06 BEE SUPPORTIVE! By nurturing and protecting bees, beekeepers spend their time making our planet healthy and beautiful. What better way to show your appreciation than by supporting their work? Organize a day at your school or local community center where local beekeepers can showcase and sell their products. Place posters and flyers in prominent places, explaining the important work of pollinators, the threats bees are facing and what beekeepers do in their work. Have signs explaining how each product is made (honey, beeswax, bee pollen, royal jelly, propolis, etc.). Buy your honey from the local beekeeper instead of from the supermarket, if possible.

LEVEL
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GOAL ALERT

This activity contributes to the SDG on **Decent Work and Economic Growth (8)**

D.07 LOCAL FORCES. Contact your local environmental authority to find out what they are doing to protect pollinators. Is there a ban on certain pesticides, at least at certain times of the year? Do they ensure local parks and gardens include a wide variety of native flowering plants? Do any local laws encourage and support beekeeping which also ensure the wellbeing of wild pollinators? If you discover local authorities are not doing enough, send them a list of suggestions and offer to work with them to organize a campaign to protect pollinators.

LEVEL
3
2
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GOAL ALERT

This activity contributes to the SDG on **No Poverty (1)**, **Zero Hunger (2)**, **Life on Land (15)** and **Partnerships for the Goals (17)**

- D.08 BEE A SOCIAL BUTTERFLY.** Launch a social media campaign to inform and mobilize your friends and family to help save pollinators. This could involve asking them to take one action per day. Also provide them with simple instructions on how to make their gardens and lifestyles more pollinator friendly.

LEVEL
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2
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GOAL ALERT

This activity contributes to the SDG on **Partnerships for the Goals (17)**

- D.09 SCHOOL CAMPAIGN.** With permission from your school authorities, launch a month-long campaign at school to raise awareness on pollinators. Place posters in the hallways and work with school gardeners to implement changes in the gardens. Team up with kitchen staff to serve local foods that are derived from pollinators and to place signs explaining the important role pollinators played in producing these foods. As part of the campaign, organize a round table at your school: invite farmers, beekeepers, wildlife experts, biology teachers and policymakers from your local government as panel members. Invite them to hold a discussion, addressing their challenges, and forming tangible plans for how they can work together to take action to protect pollinators.

LEVEL
3
2
1



- D.10 PARK PATROL.** Explore your local parks and natural areas with an eye towards how pollinator-friendly they are.
- LEVEL** 3
- Is there a diversity of native flowering plants? Are there
 - water sources or nesting spots? Do they use pesticides? Are there informative signs to raise public awareness on the importance of pollinators? Score them on a scale of how inviting they are towards pollinators and send each park a letter politely explaining how they can improve their score.



GOAL ALERT

This activity contributes to the SDG on **Partnerships for the Goals (17)**

- D.11** Do any other activity approved by your teacher or leader.
- LEVEL** 1 2 3







CHECKLIST

Keep track of the activities you are undertaking with this checklist. When you show that you have completed the activities, you will have earned the Pollinators Challenge Badge!



NAME OF PARTICIPANT:

AGE OF PARTICIPANT: ① (5–10 years) ② (11–15 years) ③ (16–20 years)

	Activity No.	Activity name	Date completed	Approved by (signature)
A What is a pollinator? 				
B Why are pollinators important? 				
C Bee concerned 				
D Take action 				

RESOURCES

AND ADDITIONAL INFORMATION

STAY UPDATED

This Challenge Badge is one of several complementary resources and activities developed by YUNGA and its partners. Please visit www.fao.org/yunga for additional resources or subscribe to the free newsletter to receive updates of new materials by sending an email to yunga@fao.org

SEND US YOUR NEWS

We would love to hear about your experience of undertaking the challenge badge! Which aspects did you particularly enjoy? Did you come up with any new ideas for activities? Please send us your materials so we can make them available to others and gather ideas about how to improve our curricula. Contact us at yunga@fao.org, twitter us: https://twitter.com/UN_YUNGA, or join us on facebook: www.facebook.com/yunga.un

CERTIFICATES AND CLOTH BADGES

Email yunga@fao.org for certificates and badges to reward course completion! Certificates are FREE and Challenge Badges can be purchased. Alternatively, groups can print their own badges; YUNGA is happy to provide the template and graphics files on request.

WEB SITES

The following Web sites provide useful educational materials, including lesson plans, experiments, articles, blogs and videos, which could be useful when undertaking the Challenge Badge with your class or group.



Apimondia, also known as the International Federation of Beekeepers' Associations, promotes beekeeping around the world.
www.apimondia.com



Convention on
Biological Diversity

The Convention on Biological Diversity (CBD) aims to conserve our planet's biodiversity, and to ensure it is sustainably used; to that end, it is leading major efforts to safeguard pollinators.
www.cbd.int/agro/pollinator.shtml



Edmonton & Area
Land Trust

Edmonton & Area Land Trust has great activities for you to learn more about pollinators.
Bee and Pollinator Activities for Kids



Food and Agriculture
Organization of the
United Nations

The Food and Agriculture Organization of the United Nations (FAO) carries out various activities to encourage pollinator-friendly practices in agricultural management and good beekeeping practices.
www.fao.org/pollination



REPUBLIC OF SLOVENIA
GOVERNMENT OF THE REPUBLIC OF SLOVENIA

The Government of Slovenia was the main force behind World Bee Day. Slovenia has a long history of beekeeping – learn all about it! www.slovenia.info/en/stories/celebrate-world-bee-day-with-us



Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) produced an Assessment Report on Pollinators, Pollination and Food Production **2017 Pollination full report**



The International Union for Conservation of Nature (IUCN) brings together influential organizations and top experts to join efforts to conserve nature and promote sustainable development. Learn about IUCN's recent campaign for pollinators across Europe at: www.iucn.org/regions/europe/our-work/pollinators-europe



Junior Master Gardener provides useful info and tips on gardening, and insects, plants and their interactions. <http://jmgkids.us/kids-zone>



National Geographic has cool facts about bees and other pollinators. www.natgeokids.com/za/discover/animals/insects/honey-bees



Nature Kids BC gets everyone involved with pollinator citizen science through surveys and taking action.

www.naturekidsbc.ca/be-a-naturekid/stewardship-citizen-science/pollinators



Protect their lives. Preserve ours.

Pollinator Partnership has a learning centre, which will teach you everything you need to know about pollinators plus things you can do to help.

www.pollinator.org/learning-center/education



The RHS Campaign for School Gardening inspires and supports schools to provide children with gardening opportunities to enhance their skills and boost their development.

<https://schoolgardening.rhs.org.uk>



United Nations Development Programme (UNDP) has a “Buzzing with life feature” with stories from beekeepers around the world and other interesting information.

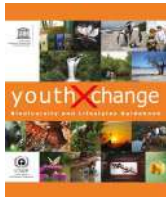
bees.undp.org



UNESCO and the **Secretariat of the Convention on Biological Diversity (CBD)** have developed a Biodiversity Learning Kit (in English, French and Spanish), targeting teachers in secondary schools. It is produced in two volumes:

Volume 1 (vol 1)

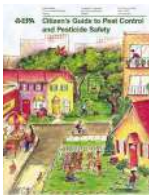
Volume 2 (vol 2)



UNESCO and **UNEP** produced a YouthXChange Biodiversity and Lifestyles Guidebook in English, French and Spanish to offer a mix of essential background information, perspectives on key debates and appropriate examples from around the world, as well as suggested starting points for engagement and action. <https://unesdoc.unesco.org/ark:/48223/pf0000233877.locale=en>



UN Environment's 2019 booklet on pollinators is full of useful facts and figures. <https://www.unenvironment.org/resources/report/2019-visual-booklet-pollinators-and-pesticides-keeping-our-bees-safe>



The **United States Environmental Protection Agency** has a great guide on safe ways to control pests at home. https://www.epa.gov/sites/production/files/2017-08/documents/citizens_guide_to_pest_control_and_pesticide_safety.pdf



World Bee Day is celebrated on 20 May every year to celebrate bees and remind all of us about the need to protect and conserve them. www.worldbeeday.org



X-Polli:Nation is a National Geographic project that shares approaches and tools between members of the public, scientists, technologists and educators in order to support pollinators, people and the practice of citizen science.
www.opalexplorenature.org/xpollination

Tweeters to follow

No, unlike hummingbirds, these tweeters are not pollinators – but they do a lot to help them! Follow these guys for information and ways to get involved in protecting pollinators!

Also follow **#PolliPromise** to see and get ideas about what people around the world are doing to help pollinators.

@worldbeeday

@UN_YUNGA

@DefraNature

@BackyardNatUK

@GYBN_CBD

Apps for figuring out flowers

Wanna know what that exotic-looking purple flower is or that humble little yellow one? Are they native to your area? Fear not – several apps out there can help you become a real flower detective. Check them out!

iNaturalist www.inaturalist.org

What's That Flower www.whatsthatflower.com

FlowerChecker www.flowerchecker.com

GLOSSARY

AGROECOLOGY: is the application of ecological principles and concepts to the design and maintenance of sustainable food systems and can incorporate many types of sustainable agriculture within a larger food system.

AGROECOLOGICAL FARMING: Agroecological farming is knowledge, management, and labour-intensive rather than external input-intensive, and aims to regenerate long-term agroecosystem properties by incorporating functional biodiversity, leading to sustainable, resilient systems. Agroecological methods are often rooted in traditional farming practices and (or) are co-developed by farmers and scientists with the aim to enhance food sovereignty (Garibaldi *et al.*, 2017)

ANTHER: The head of the **stamen**, responsible for producing the pollen that is transferred to the pistil.

ANTIOXIDANT: Antioxidants are compounds such as vitamin C or E, lycopene and lutein, which prevent or stop **oxidation**.

APIARIST: A **beekeeper**.

BEE-COLONY: A group of bees that live together in a hive, usually consisting of several thousand worker bees, a queen bee and, in the summer, hundreds or thousands of drones.

BEEKEEPER: A person who keeps bees, especially to produce honey, but also in some areas (almost) solely for commercial pollination services.

BEEKEEPING: Also known as apiculture, this is a set of activities concerned with the practical management of the social species of bees.

BEE POLLEN: A ball of pollen grains made by bees when they land on a flower. It's a mixture of many pollen grains, bee saliva, and nectar or honey. It is said to have many health benefits for humans and is widely available commercially.

BEESWAX: This is wax secreted by bees to make honeycombs, which humans use to make skincare products, polishes and candles.

BIODEGRADABLE: Objects or material that can be decomposed by bacteria or other living **organisms**.

BIODIVERSITY: The variety of all the different kinds of plant and animal life on Earth, and the relationships between them.

CLIMATE: It refers to the long-term average, or overall picture, of the everyday weather experienced in a location. It is the big picture of temperatures, rainfall, wind and other conditions over a long period of time (30 years or more).

CLIMATE CHANGE: A change in the overall state of the Earth's **climate** (such as temperature and rainfall). It is caused by natural causes (e.g. **volcanic** eruptions, changes in ocean currents and changes in the activity of the sun) and by human causes (e.g., burning of **fossil fuels**).

COMPOST: Decayed organic material that is used as a natural plant **fertilizer**.

CROSS-POLLINATION: Pollination of a flower or plant with pollen from another flower or plant.

DEGRADATION: Environmental degradation is the deterioration (or worsening) of the environment through damage to resources such as air, water and soil, destruction of **ecosystems** and habitats, and the extinction of wildlife.

DEGRADED LAND: Land in a state that results from persistent decline or loss of biodiversity and ecosystem functions and services that cannot fully recover unaided.

DEFORESTATION: Humans removing a forest or part of a forest (e.g. by cutting it down and burning it) to use the wood (e.g. for fuel or to make paper or furniture) or to use the land for something else (e.g. farming or building on it). Deforestation can be permanent, when this change is definitive, or temporary when this change is part of a cycle that includes natural or assisted regeneration.

DROUGHT: A prolonged period of abnormally low rainfall, resulting in a shortage of water.

ECOLOGICAL INTENSIFICATION: knowledge-intensive process that emphasizes management to enhance ecological processes to improve agricultural system performance, efficiency and farmers' livelihoods.

ECOSYSTEM: A community of living things (plant, animal and micro-organism) and non-living things (water, air, soil, rocks, etc.) interacting in a functional unit. Ecosystems don't have a defined size: An ecosystem can be as small as a puddle or as big as an entire desert. Ultimately, the whole world is one big, very complex ecosystem.

ECOSYSTEM SERVICES: The different benefits that humans receive from the environment and healthy **ecosystems**. In the Millennium Ecosystem Assessment, ecosystem services can be divided into supporting, regulating, provisioning and cultural. This classification, however, is superseded in IPBES assessments by the system used under "nature's contributions to people".

EVOLVE: The process whereby the characteristics of a species gradually change over time, usually over many generations.

EXTINCTION: A plant or animal species becomes extinct when no more members of that species are alive anywhere on the planet.

FERTILIZATION: In flowering plants, this is the joining of male and female reproductive cells to produce a fertilized egg that develops into a seed.

FERTILIZER: In farming or gardening, this is a chemical or natural substance added to soil or land to help plants grow.

FOOD INSECURITY: Exists when people lack access to sufficient amounts of safe nutritious food and, for this reason, are not consuming enough for an active and healthy life. This may be due to the unavailability of food, poverty or waste. [Source: FAO]

FOOD SECURITY: The state in which all people at all times have both physical and economic access to sufficient, safe and **nutritious** food that meets their dietary needs for an active and healthy life. [Source: FAO]

FLOOD: An overflowing of a large amount of water, over what is normally dry land.

HAZARD: A natural or human-caused phenomenon that could hurt people or the environment.

INTEGRATED PEST MANAGEMENT (IPM): A big-picture approach to tackling pests that involves managing the entire ecosystem.

INVASIVE ALIEN SPECIES: Animals, plants and other species that have been introduced to an area from elsewhere, either by accident or on purpose, and negatively affect the native habitat by out-competing with native species.

INVERTEBRATE: An animal lacking a backbone, including arthropods, such as insects, or mollusks, such as snails and octopi.

LAND-USE CHANGE: The human use of a specific area for a certain purpose (such as residential; agriculture; recreation; industrial, etc.) that can lead to a change in land cover such as a loss of forests.

MALNUTRITION: A state in which a body can no longer maintain even its basic physical functions because of inadequate or unbalanced food intake.

MICRO-ORGANISM: A creature that is too small to be seen with the human eye alone, but that can be seen through a microscope. Micro-organisms include bacteria, viruses, yeasts, moulds and parasites.

MICRONUTRIENTS: Vitamins and minerals that the body needs in relatively small amounts, but which are essential for human health and well-being.

NUTRIENTS: Chemicals that animals and plants need to live and grow.

NUTRITIOUS: Nutritious foods supply adequate amounts of essential **nutrients** to allow our bodies to function, grow and develop healthily.

ORGANIC GARDENING OR FARMING: An agricultural process that uses biological fertilizers and pest control acquired from animal or plant waste. It originated as a holistic system for enhancing soil fertility, water storage, and the biological control of crop pests and diseases and was traditionally associated with low-input, small-scale, diversified farms.

ORGANISM: An individual living creature such as a tree, a virus or a human being.

OXIDATION: A chemical reaction that can produce free radicals, leading to chain reactions that may damage the cells of living beings. **Antioxidants** such as certain vitamins can stop these chain reactions from happening.

PARASITES: An **organism** (animal) that lives on, in or with an **organism** of another species, obtaining food, shelter or other benefit at the expense of the host, which it may directly or indirectly harm.

PATHOGEN: Any disease-producing agent, especially a virus, bacteria or other **micro-organism**.

PISTIL: This forms the female parts of a flower. It is composed of four parts: the **stigma**, style, ovary and the ovule.

POLLEN: A fine powdery substance, typically yellow, consisting of microscopic grains discharged from the male part of a flower or from a male cone.

POLLINATION: The transfer of pollen from the male part of a flower to the female part, which enables the plant to reproduce.

POLLINATOR: An animal that moves pollen between flowers and helps them to reproduce.

ROYAL JELLY: A substance that honeybee workers secrete and feed to larvae as well queen bees. People use royal jelly as a dietary supplement.

SELF-POLLINATION: The pollination of a flower by pollen from the same flower or from another flower on the same plant.

SMALLHOLDER FARMS: A small farm usually supporting just one family, by growing crops both for income and for feeding the family.

SOIL EROSION: The wearing away of the land surface by rain, running water, wind, ice, gravity or other natural processes or human activities.

STAMEN: The male **fertilizing** part of a flower. This includes the **anther** and the filament.

STIGMA: The female part of a flower that receives pollen and begins the process of **fertilization**.

SUSTAINABLE: Using the natural environment to meet our (human) needs without damaging it so that it can continue to be productive (continues to support plant, animal and human life). Making sure that our actions are sustainable means that future generations will be able to live well, too.

SUSTAINABLE AGRICULTURE: Sustainable agriculture aims to protect the environment, expand the Earth's natural resource base, and maintain and improve soil fertility.

SUSTAINABLE DEVELOPMENT: Achieving development that is inclusive, does not deplete natural resources, and will continue to meet the needs of future generations.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): A set of 17 goals adopted by the United Nations Member States in 2015 as a universal call to end poverty, protect the planet, and ensure that all people enjoy peace and prosperity by 2030.

VEGETATION: An assemblage of plant species (including trees) and the ground cover they provide.

VERTEBRATE: Any animal with a backbone or spinal column.

WETLANDS: A distinct ecosystem that is flooded by water, either permanently or seasonally. Some types include marshes or swamps.

ACKNOWLEDGEMENTS

Great gratitude goes to everyone who made the Pollinators Challenge Badge a reality. We would particularly like to thank the different organizations, and all the enthusiastic Guides, Scouts, school groups and individuals worldwide who thoughtfully pilot-tested and reviewed the initial drafts of the Badge.

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This document was developed under the coordination and editorial supervision of **Reuben Sessa**, YUNGA Coordinator and Youth Focal Point for FAO.

See our Web site (www.fao.org/yunga) or register to our free mailing list to find out about current initiatives and resources.

This badge was developed in collaboration with and is endorsed by:



Food and Agriculture
Organization of the
United Nations

Food and Agriculture Organization of the United Nations (FAO) leads international efforts to enhance global agricultural performance. Serving both developed and developing countries, FAO acts as a neutral forum where all nations meet as equals to negotiate agreements and debate policy. FAO is also a source of knowledge and information, helping countries to modernize and improve agricultural policies in relation to land and water management. FAO has responded to the loss of pollinators with the Global Pollination Project.

FAO's Global Action on Pollination Services for Sustainable Agriculture: www.fao.org/pollination



Apimondia also known as the International Federation of Beekeepers' Associations, promotes scientific, ecological, social and economic apicultural development in all countries and the cooperation of beekeepers' associations, scientific bodies and of individuals involved in apiculture worldwide).

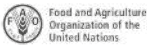
www.apimondia.com



Convention on
Biological Diversity

Convention on Biological Diversity (CBD) was created to conserve biodiversity, ensure its sustainable use, and ensure fair and equitable sharing of benefits arising out of the utilization of genetic resources, the CBD works with countries, organizations, indigenous peoples and local communities and relevant stakeholders, to prevent the loss of biodiversity, including wild and managed pollinators and to protect and support all ecosystems, including those beyond agricultural and food production systems, particularly those that support the livelihoods and culture of indigenous peoples and local communities.

www.cbd.int



Food and Agriculture
Organization of the
United Nations

COMMISSION ON
GENETIC RESOURCES
FOR FOOD AND
AGRICULTURE

Commission on Genetic Resources for Food and Agriculture established in 1983 is the only permanent intergovernmental body that specifically addresses biological diversity for food and agriculture. The Commission aims to reach international consensus on policies for the sustainable use and conservation of genetic resources for food and agriculture and the fair and equitable sharing of benefits derived from their use. The Commission offers a unique platform for its members and other stakeholder promoting a world without hunger by fostering the use and development of the whole portfolio of biodiversity important to food security and rural poverty.

www.fao.org/cgrfa



REPUBLIC OF SLOVENIA
GOVERNMENT OF THE REPUBLIC OF SLOVENIA

The Government of Slovenia was the driving force behind World Bee Day, celebrated on 20 May around the world each year. Beekeeping is an important agricultural activity in Slovenia with a long and rich tradition. Typical is the use (from the mid-eighteenth century on) of unique painted wooden beehive panels. These authentic open-air galleries of folk story-telling art help bees orientate themselves and make it easier for beekeepers to distinguish individual hives. Slovenia is the home of the Carniolan honey bee (*Apis mellifera carnica*), an indigenous Slovenian subspecies of bee. Known for its hard work and gentle behaviour towards beekeepers, it's the second most widespread bee variety in the world. In 2011, Slovenia was one of the first EU countries to prohibit the use of certain pesticides harmful to bees in its territory.

www.worldbeeday.org/en/about/why-slovenia.html



International Centre
for Young Beekeepers

International Centre for Young Beekeepers (ICYB)

is an association whose main mission is to provide international support and coordination of young and starting beekeepers and of their international meetings.

www.icyb.cz



The Scottish Beekeepers Association (SBA)

The organisation's purposes are to support honey bees and beekeepers, to improve the standard of beekeeping, and to promote honey bee products in Scotland through the advancement of: education; environmental protection, and heritage, culture and science.

www.scottishbeekeepers.org.uk



Slovenian Beekeepers' Association

The Slovenian beekeepers, who are mostly united in the Slovenian Beekeepers' Association, are proud to continue and to preserve the tradition of their ancestors. They take special care in the conservation of the autochthonous Carniolan bee, the protection of its life habitat, and the production of the finest bee products. The Slovenian Beekeepers' Association has initiated several projects, including the Honey Breakfast, beekeeping school clubs, and efforts to promote nectar-bearing plants, which have been warmly welcomed by the general public. In 2014, it launched the initiative to declare World Bee Day.

www.czs.si



The United Nations Educational, Scientific and Cultural Organization (UNESCO)

seeks to build peace through international cooperation in education, the sciences and culture. UNESCO's programmes contribute to the Sustainable Development Goals.

www.unesco.org



WORLD ASSOCIATION
OF GIRL GUIDES
AND GIRL SCOUTS

The World Association of Girl Guides and Girl Scouts (WAGGGS) represents 10 million girls from 150 countries, making the world's largest voluntary movement dedicated to girls and young women. For more than 100 years, WAGGGS provides safe spaces for girls to learn by doing, at their own pace and in places local to them.

www.waggggs.org



The World Organization of the Scout Movement (WOSM) is an independent, worldwide, non-profit and non-partisan organization that serves the Scout Movement. Its purpose is to promote unity and the understanding of scouting's purpose and principles while facilitating its expansion and development.

www.scout.org



THE YOUTH AND UNITED NATIONS GLOBAL ALLIANCE (YUNGA) IS A PARTNERSHIP BETWEEN UNITED NATIONS AGENCIES, CIVIL SOCIETY ORGANIZATIONS AND OTHER ENTITIES TO DEVELOP INITIATIVES, RESOURCES AND OPPORTUNITIES FOR CHILDREN AND YOUNG PEOPLE TO LEARN, GET INVOLVED AND MAKE A DIFFERENCE.

YUNGA ACTS AS A GATEWAY TO ALLOW CHILDREN AND YOUTH TO BE AWARE AND INVOLVED IN THE ACTIVITIES AND INITIATIVES OF THE UNITED NATIONS. UNITED NATIONS CHALLENGE BADGES ARE BEING DEVELOPED BY UN AGENCIES AND OTHER ORGANIZATIONS INVOLVED IN YUNGA.

**PRINTED ON ECOLOGICAL PAPER
FSC (FOREST STEWARDSHIP COUNCIL) CERTIFIED**

WE ARE MANY. WE ARE YUNGA!

The purpose of the **United Nations Challenge Badges** is to raise awareness, educate and motivate young people to change their behaviour and be active agents of change in their local communities. Additional Badges are available or are being developed on a number of other topics including: Agriculture, Biodiversity, Climate Change, Disaster Risk Reduction, Energy, Forests, Gender, Hunger, Nutrition, Oceans, Soils and Water.

The **POLLINATORS CHALLENGE BADGE** is designed to help educate children and young people about the importance of pollinators for people and the planet, and how to help safeguard them against extinction. This material is appropriate for use in school classes, Guide or Scout groups or youth meetings generally. It includes a wide range of activities and ideas to stimulate learning about protecting pollinators.

FOR MORE INFORMATION ON THIS AND OTHER MATERIALS CONTACT



**YOUTH AND UNITED
NATIONS GLOBAL
ALLIANCE (YUNGA)**

**FOOD AND AGRICULTURE
ORGANIZATION OF THE
UNITED NATIONS (FAO)**

VIALE DELLE TERME
DI CARACALLA,
00153, ROME, ITALY



yunga@fao.org



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