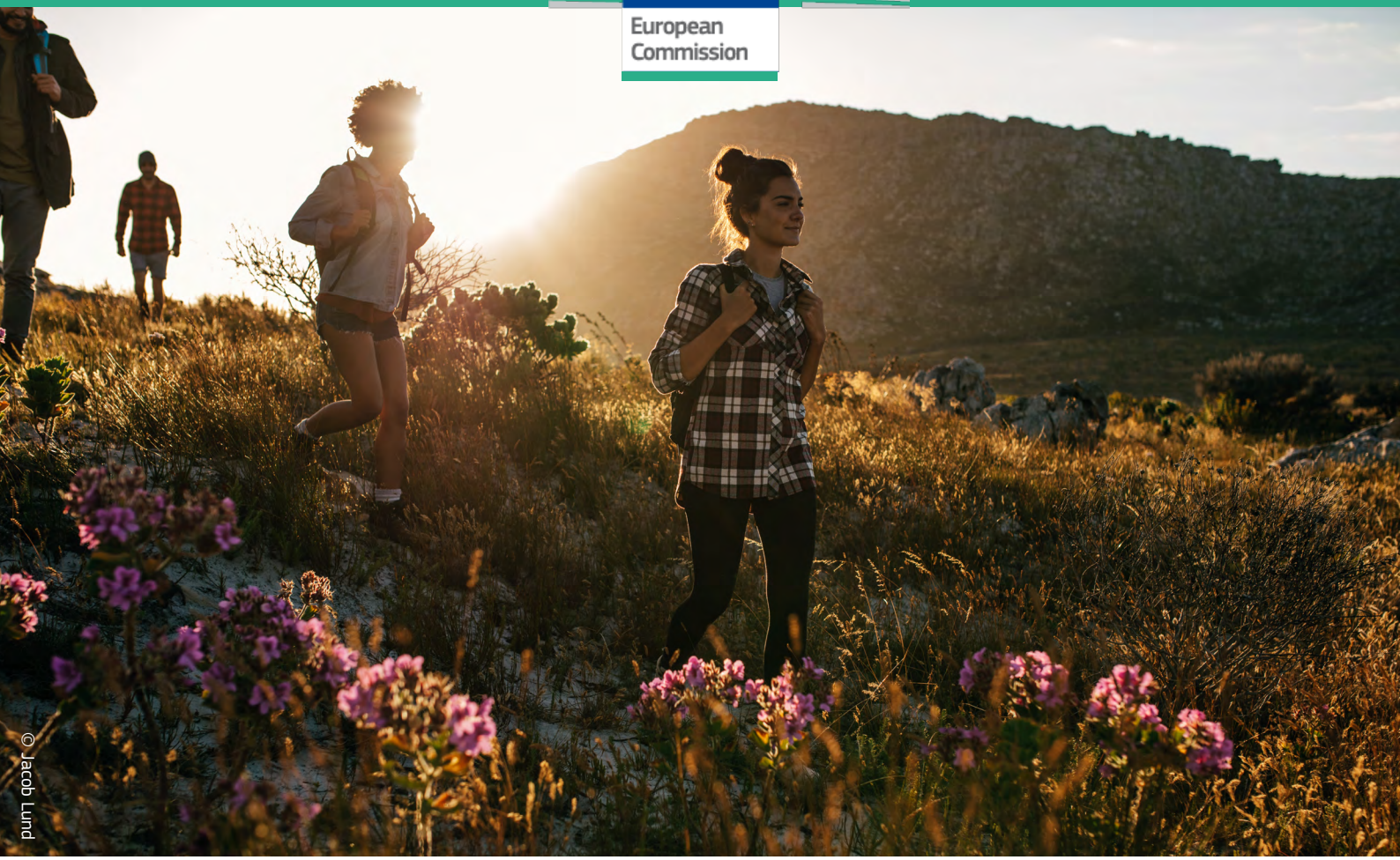
European Commission



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Citizens for pollinator conservation:

a practical guidance

Environment

Citizens for pollinator conservation: **a practical guidance**

IEEP 2020. Citizens for pollinator conservation: a practical guidance. Guidance prepared by the Institute for European Environmental Policy for the European Commission.

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Date of completion: June 2020

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Citizens for pollinators conservation: **A practical guidance**

Why is this guidance needed and who is it for?

This guidance is for you - the citizens of Europe – who care about wild pollinators and wish to join the efforts for reversing their decline. Here you can find useful advice and concrete actions to help pollinators in your daily life, including inspiring success stories. Your actions will provide a crucial contribution to the EU efforts in tackling the decline of pollinators[1].

What are pollinators, why do they matter and why are they declining?

In Europe, bumblebees, solitary bees and hoverflies are the most prolific pollinators. Also important are other insects such as butterflies, moths, wasps, beetles, and flies. They pollinate crops that we rely on for food and other resources as well as wild plants.

Pollinators are a crucial part of a functioning ecosystem and indispensable for human food and fibre production (fruits, nuts, vegetables, vegetable oils, cotton, and flax).

Yet, pollinators face a multitude of threats and many species are in decline or threatened with extinction.

Decisive action is needed to halt the decline and put pollinator populations on the path to recovery.

Diversity of wild pollinators[2]

[1] EU Pollinators Initiative, https://ec.europa.eu/environment/nature/conservation/species/pollinators
[2] Photos credits see annex 3

Threats to pollinators and their habitats and reasons for their decline

An international team of experts assessed the key threats to wild pollinators as: land use change and loss of habitat, intensive agriculture and pesticides, pollution (including light pollution), invasive alien species, and climate change [1][3]. The most important change has been the loss of wildflowers from our landscapes.

The good news is that gardens and green spaces in towns and cities can be important habitats for pollinators that are struggling to survive in intensively managed farmland and forests [2] [3]. We can all contribute to reversing the decline!

See more ideas for creating habitats for pollinators in the annex.

What is the European Commission doing about pollinator decline?

In June 2018, the European Commission has launched the first-ever comprehensive **EU Pollinators Initiative**. The objectives and actions set out in this initiative aim to improve the scientific knowledge about pollinator decline, tackle its main known causes and strengthen collaboration between all the actors concerned. The initiative aims to engage citizens, through citizen science and conservation actions.

For more information:
EU Pollinators Initiative[4]
EU Pollinators Initiative website[5]
EU Pollinators Information Hive[6]


Wildflower meadow habitat © Adonyig, Pixabay

[3] In 2016 the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) published the first global assessment of pollinators and pollination
[4] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52018SC0302
[5] https://ec.europa.eu/environment/nature/conservation/species/pollinators/index_en.htm
[6] https://wikis.ec.europa.eu/display/EUPKH/EU+Pollinator+Information+Hive

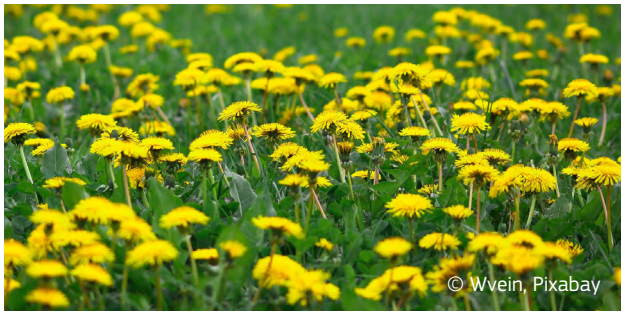
How can I help pollinators?

Pollinators need places (habitats) with food, water and shelter to raise their young and an unpolluted environment to thrive. You can take various actions to help with these needs and support the wellbeing of pollinators – as an individual or with your family, friends, and wider community.

Pollinator conservation actions can take place in your personal space (your home and garden) or common spaces in your neighbourhood and wider area. You can also help the pollinators by becoming a pollinator-friendly consumer and a citizen scientist.

Personal space

- Plant a variety of native plants to ensure flowers are present throughout the season
- Rewild part of your garden
- Allow your lawn to flower by mowing less
- Avoid using pesticides
- Reduce light pollution by turning off unnecessary outdoor lighting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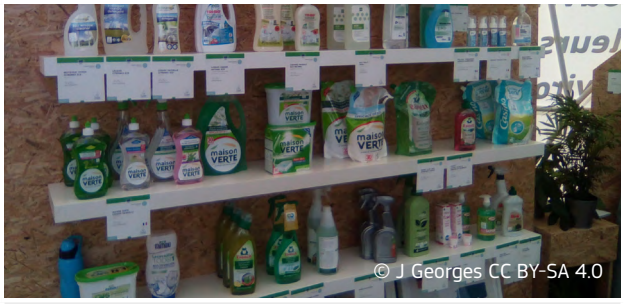
Community and work spaces - join or lead actions

- Become a pollinator ambassador and encourage your city to take action
- Spread the word, celebrate and start competitions and exhibitions related to pollinators
- Encourage pollinator activities in schools and kindergartens
- Make space for pollinator habitat in your workplace, and lead nature walks with your colleagues
- Stimulate engagement in your community, and create habitats for pollinators

Better consumer

- Choose environment friendly products
- Avoid harmful products and producing too much waste
- Eat local, organic, and seasonal food
- Buy low impact outdoor lighting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Citizen Scientist - pollinator monitoring and awareness raising

- Improve your pollinator identification skills with tools and training
- Use your skills to observe pollinators in your area
- Take part in a pollinator monitoring programme

Small steps → tangible results → real change

1. PERSONAL SPACE

What can I do at home and in my garden?

Plant native plants and do it everywhere. You do not need much space or special conditions to plant for pollinators: you can use window boxes, flower pots on balconies, and hanging baskets. Make sure you choose a diverse range of plants to ensure flowers are blooming in your space in spring, summer, and autumn (from March to October) providing nectar and pollen sources to pollinators in all seasons. Create a small kitchen garden with pollinator-friendly herbs such as chives, lavender, rosemary, thyme and sage. Collect local wild flower seeds for planting in your garden. If you buy plants, ask the seller if they were grown without using pesticides.

BELGIUM
The Wallonian government Plan Maya[7] promotes actions for citizens, regions (communes) and beekeepers in this Belgian region. Citizens are invited to sign the Charta Maya and become 'Jardinier Maya' by stopping the use of pesticides and planting 10m^2 of flowering plants for bees.

Let your lawn flower. Cut grass areas less frequently to allow the flowers to bloom and leave areas uncut along fences and pathways to create wildflower patches. Dandelions, buttercups, and clover are great pollinator food.

Let your hedge and shrubs flower. Leave your hedge cutter lying for a while and let your shrubs and trees flower – they will attract lots of bees.

Leave wild places. Don't be too tidy. Patches of bramble and ivy provide important food and shelter. Nettles provide food for many native insects, including butterflies. Flowering 'weeds' are actually valuable nectar and pollen resources.

Protect and provide nesting places. Offer pollinators nesting spots by leaving patches of rough, uncut grass, tree snags and deadwood in your garden, leaving bare batches of sandy soil, or by building or buying bee houses. Additional nesting places you can provide are untouched earth banks, bare soil, dry stones, wood pallets and logs.

Ensure a source of water. A shallow basin of water set on the ground with some stones or piles of gravel in it or a small pond on which insects can perch will help pollinators quench their thirst. You can even make a small pond with a bucket.

Do not use pesticides. Insecticides also kill non-target insects, including pollinators, and fungicides can be poisonous to them too. Herbicides kill native plants that pollinators rely on as a food source. Make the commitment to avoid using chemicals and to maintain your garden in a natural way. Do manual weeding instead of using herbicides – but keep some weeds with flowers too. Encourage natural predators of pests to protect your plants, such as hoverflies (whose larvae eat aphids) and beetles (they eat snails and slugs amongst other invertebrates), by providing suitable habitat.

Plant native species. Learn which pollinator plants are native to your area. Native plants co-evolved with the native wildlife of your region and provide pollinators with food – think about the caterpillars and hoverfly larvae too. Non-native species have the potential to spread, become invasive and harm natural plant communities. They do not have predators or herbivores to keep them under control outside of their native range and can be better adapted to compete for food sources and habitats. Additionally, non-native species can be less vulnerable to disease or can bring in diseases to which local species are not immune. Horticultural varieties often have very little pollen and nectar.

Minimise light pollution outdoors. Pollinators that feed primarily at night, like nocturnal moths, can become confused by artificial light and disoriented in their search for flowers or mates. Think twice whether you need to keep lights on at night in your garden, terrace, or front door continuously. Install temporal limiters – motion activation and/or automatic timers that extinguish lights when not needed or dim light sources to the lowest acceptable light intensity. Shield lights above and below and use lights with a red wavelength rather than blue.

[7] http://biodiversite.wallonie.be/fr/plan-maya.html?IDC=5617

Avoid use ultraviolet light bug zappers or other insect traps. These traps also catch and kill non-target insects, such as pollinators. Some of them are useless at catching mosquitos, which are much more attracted to our bodies, but kill more beneficial insects such as moths. Use alternative nature-friendly ways to keep annoying insects away.

Make your car parking space pollinator friendly. Take away the tarmac and use paving that has spaces for low growing wild flowers such as thyme.

See more ideas for creating habitats for pollinators in the annex.

Bumblebee queen burrowing to her nest © CC BY-SA 3.0 Pahazzard wikimedia commons

2. COMMON SPACES – JOIN AND LEAD ACTIONS ON POLLINATORS

Arctia caja © Starover Sibiriak/Shutterstock

What can I do in my neighbourhood and wider community?

Become an ambassador for pollinators in your community and beyond. Set an example and share your own experience. One pollinator-friendly garden is good; an entire neighbourhood or community of them is even better. Encourage others to make their gardens and land welcoming to pollinators too. Create a network of pollinator friendly gardens. Organise a Bioblitz for pollinators[8].

Join an environmental-volunteering group to help with the conservation of local nature, including pollinators.

Spread the word. Share information with your community, colleagues, and others about the importance of protecting pollinators. Lead a simple and intriguing awareness campaign, share educational materials and interesting resources.

IRELAND
The All Ireland Pollinator work plan[9] includes guidance for people with gardens, local communities, faith communities, and businesses. The All Ireland Pollinator Plan Junior Version 2015-2020 shows children how important bees are, and how they can be involved in making their schools and gardens more bee-friendly.

Celebrate pollinators and their role on World Bee Day on May 20th every year. Any format of a celebration will be useful and coupling it with exciting awareness raising and crowdsourcing for concrete pollinator conservation work is even better.

NETHERLANDS
The Wild Beeline initiative, coordinated by 'De Landschappen', is connecting new and existing bee habitat and raising awareness of the indispensable role of wild bees in the Netherlands. The project organised a Bee Happy Day to encourage people to make their own spaces more bee friendly. The Dutch Pollinator strategy Bed & Breakfast for Bees[10] lists many creative initiatives.

Stimulate engagement with a competition in your community connected to pollinator conservation, for example for the best pollinator garden. Symbolic prizes and simple schemes to reward efforts and achievements are a nice way to keep people motivated. Organize a pollinator photo or drawing exhibition for different age groups in the community.

Protect existing sources of food and shelter for pollinators. Preserve patches of wildflowers, weedy plants, flowering hedgerows, lawn edging, long grass, bare soil and ground, dry stone walls etc. These habitat patches can be in local parks, communal gardens and green spaces, along road verges, pathways and railways, and in any unused spaces. Talk to the landowner or contact your local authority to point out the importance of these spaces.

Create a community wildflower meadow. No matter what the size, a patch of grass can be converted into a colourful, flower rich meadow. In the first year, let the grass grow to see what flowers you already have. Cut in the late summer or autumn and rake and remove cuttings. In the second year, cut, rake, and remove cuttings in spring to reduce the grasses, and then sow with a native wildflower seed mix. Maintain the meadow by cutting late in the year and removing cuttings. Encouraging species such as yellow rattle can also help maintain the meadow as it helps to reduce grass and create space for more wildflowers. Avoid using pesticides, herbicides and fertilisers. If you need to control very vigorous plants such as docks or nettles, do so by cutting or weeding just those patches.

[8] A bioblitz is an outdoor event in which teams of volunteers work together to find and identify as many species as possible in an area.
[9] https://pollinators.ie/
[10] https://promotepollinators.org/wp-content/uploads/sites/117/2018/07/nl-pollinator-strategy-bed-breakfast-for-bees.pdf

What can I do in my children's school and kindergarten?

Encourage pollinators activities to schools and kindergartens. Organise a a 'Pollinator Day'; promote storytelling and reading about pollinators, or design a craft project to make furry bumblebees or a hoverfly using biodegradable materials. Develop creative projects to design and create pollinator habitats or bee houses. Organise pollinator art competitions.

EU POLLINATORS TRUMP CARD GAME – play the game of which pollinator is most important for wildflowers, which for food, and who is the smallest? You can download it on the EU pollinators information hive. You can also find a webpage with links to educational materials in different languages.

Promote pollinator friendly practical activities in nature. Transform the school premises together with the teachers and children into a natural refuge for pollinators, and introduce children to what pollinators need for food and shelter. Create log piles, plant hedges, create a meadow, plant a flower garden and create hoverfly lagoons (see annex). Teach children to recognise the main pollinators in your area and look for them together.

CYPRUS
The POMS-Ký pollinator monitoring initiative[12] aims to raise awareness about pollinators and engage citizens of all ages in observing and recording pollinators on native and non-native plants. It runs seminars at the Akrotiri Environmental Education Centre for citizens to learn to identify major taxonomic groups (beetles, bugs, butterflies, bees & solitary bees and flies) and how to perform flower insect counts. It has put together the mini-poms-ký kit for teachers to monitor pollinators with schoolchildren.

See more information about how to do these activities in the annex.

[11] https://www.youtube.com/watch?v=neKZn5q53cs

What can I do in my workplace?

Raise awareness about the importance of pollinators and their decline. Put up a wild pollinator poster, invite an inspiring speaker, start discussions during lunch and refreshment breaks.

Distribute wildflower seeds and encourage your work colleagues to do some small-scale pollinator-friendly planting (on walls, balconies, office roofs, courtyards, carparks).

Enjoy nature with your colleagues. Organise a team building event in nature focusing on pollinators and engage colleagues in planting hedges and pollinator-friendly flowers around the outdoor parking area, greening the facade of your building, creating a flower or vegetable garden on the roof, building insect hotels and shelters. **Create a team of volunteers** – get everyone involved in mowing and raking the wildflower meadow!

How can I become a 'local champion'?

Encourage your local authorities to manage green spaces for pollinators. Most green spaces are managed by local authorities. These authorities are beginning to recognize the value of planting native flora in gardens, roundabouts, parks, cemeteries, and other public areas to help pollinators. Encourage your authority to improve the area you live in by creating space for pollinators as well as people, or simply by mowing less often to allow native flowers to thrive or leaving wildflowers and grass spaces untouched. This can often save money too.

SLOVAKIA

City Bees project in the Bratislava municipality Karlová Ves[12]: **The green space management team leaves circles with uncut grass on green spaces (such as the slopes along the tramways). The circles remain green when the rest of the mown grass turns brown and dry, and so look visually attractive whilst providing flowering resources for pollinators throughout the summer and hibernation sites during winter. Most of the green spaces were previously cut about seven times each year.**

Ask your local authority to become a 'pollinator friendly city'. You can find a template for a local pollinator strategy on the EU Pollinator Information Hive. Send the template to your local politicians. Drive the development of a pollinator plan, pollinator-friendly city vision and policy programme at the local level.

GERMANY

Berlin's pollinator protection strategy[13] **published in April 2019 identifies actions to transform green space management, to produce a Berlin bee-friendly plants list, to inform private citizens about the impacts of pesticides on bees, to make a bee-friendly label for private gardens and allotments, and to provide training for allotment managers to stop using pesticides. Other German cities have similar strategies.**

Identify and promote pollinator places. Brownfield sites, unused urban spaces, and abandoned pieces of land present an opportunity for restoration or natural regeneration of pollinator habitats.

Raise the profile of pollinators in relevant local sectors, in order to integrate pollinator conservation in local policies for spatial planning, transport, building codes, management of green areas and so on. Support plans for pollinator-friendly green infrastructure and green corridors ('B-Lines'[14]) and engage in local planning to ensure pollinators are given due account.

[12] https://mestske-vcely.sk/vcely-v-meste/
[13] https://www.berlin.de/senuvk/natur_gruen/biologische_vielfalt/download/strategie_zum_bienenschutz_in_berlin_2019.pdf
[14] B-Lines are a series of 'insect pathways' running through countryside and towns, along which to restore and create a series of wildflower-rich habitat stepping-stones. For more information: https://www.buglife.org.uk/our-work/b-lines

BELGIUM
The city of Genk Bee Plan, approved in 2014, was developed by a working group of beekeepers, city services, environmental organisations and concerned citizens. The plan aims to improve pollinator living conditions on public land and engage citizens to do the same. Find out more in the EU guide for pollinator friendly cities.

Push for change at higher political levels. To succeed in reversing the decline of pollinators, change has to happen from the top-down as well as from the bottom-up. Contact your representatives at regional, national and EU level to better link actions across different governance levels.

LUXEMBOURG
The country is developing a national plan for pollinators by asking its citizens for ideas for actions and sharing these on the Panorama d'idées[15] web platform.

Find out what people are doing in other Member States on the EU Pollinator Information Hive[16].


© Mina Marie Michell, Pexels

[15] https://fr.planpollinisateur.org/panorama
[16] https://wikis.ec.europa.eu/display/EUPKH/Member+States+initiatives

3. BE A BETTER CONSUMER

How can I make my consumer behaviour more pollinator-friendly?

Review your consumer choices from the perspective of pollinators: Choose materials with the EU organic label or products which are labelled as sustainably sourced with care for biodiversity conservation. Check the labels for non-food products too to check whether they are eco-friendly[17]. Scrutinize products and advertisement campaigns and make your consumer choices more conscious of the environment and wildlife. Check that flea treatments for your pet do not contain imidacloprid or fipronil or other chemicals harmful to pollinators [4]. Check that plants you buy in the garden centre are not treated with pesticides harmful to pollinators [5] [6].

Buy local food produced in a biodiversity-friendly way. Look for products that are produced without pesticides and other harmful pollutants, without impacts on climate change. Become a 'locavore'! 'Buy seasonal locally grown food – check what your local farmers are doing to help pollinators thrive in farming landscapes. Subscribe to a locally sourced organic produce basket to make your commitment to sustainability. Buy honey from a beekeeper who takes care of biodiversity and supports flower-rich meadows for all pollinators.


© Rawpixel, Shutterstock

Geranium plant © CC BY-SA 4.0, Mokkie, Wikimedia commons

Minimise your consumption and use of products which might affect pollinators and their habitats: Avoid substances which might pollute and persist in the environment or are not biodegradable – such as single use plastics, micro-plastics, heavy metals, paints, detergents and other dangerous chemicals.

Buy outdoor lighting that is more pollinator-friendly. When you install or change lighting, think about where and when you really need it and install timers and/or motion sensors. Choose dimmer lights that produce warm light (light from the red spectrum is less disturbing to insects) and that are shielded above and below so that the light is less spread out [7].

Do not buy ultraviolet light bug zappers or other insect traps. UV light bug zappers do not control mosquitos and they kill many beneficial insects including pollinators [8]. It is better to use natural repellents such as lemon eucalyptus oil. You can also plant mosquito repelling plants around your patio.

[17] For example, EU Ecolabel, FSC (Forest Stewardship Council) or MSC (Marine Stewardship Council)

4. A CITIZEN SCIENTIST - MONITORING POLLINATOR POPULATIONS

Citizen science initiatives on pollinators are designed to obtain data on the occurrence, abundance, and distribution of pollinating insects. This helps scientists and policymakers to better understand what is happening with individual species, and to ensure timely action to prevent their decline or even disappearance. Citizen science is also a way to actively engage society in pollinator conservation. Data that you collect can become an incredibly valuable contribution to research and conservation projects. There are many platforms and initiatives which rely on the input of citizens for the collection of data and will welcome your input.

How can I become a citizen scientist?

Look for a pollinator monitoring initiative in your local area or region and contact local pollinator experts. Join a community group or take part in a training course to improve your identification skills.

Download one of the many guides or apps for recording pollinators, species identification, observations, geographical spread, and photos.

AUSTRIA
An Austrian citizen science campaign collects butterfly records from citizens using an app (Schmetterlings-app)[18]. In 2018, more than 13,000 citizens recorded around 90,000 observations of 142 species, i.e. two thirds of the national total of 215 butterfly species [9].

Observe and register sightings of pollinator species onto dedicated websites and databases. Participate in platforms that provide identification guides and expert verification of observations. Keep an eye on new arrivals, reporting anything interesting you see to your local or national biodiversity recording group. Your observations provide data for better mapping of species distributions and how they are changing.

PORTUGAL
BioDiversity4All[19] - This website has the mission to catalogue Portuguese biodiversity and anyone can register sightings of a species within the Portuguese territory, thereby educating and raising awareness of biodiversity. It has more than 1,400 users and partners in Portugal.

Take part in monitoring programmes. Take on your own bumblebee or butterfly transect as part of an organised monitoring scheme or use your garden or local green space as an observatory.

European Butterfly Monitoring Scheme[20] – Thousands of volunteers and over 15 national organisations count butterflies using a standardised method every summer. The data are used to compile the European Grassland Butterfly indicator[21] which is used to inform and track policy in the EU and by national governments.

An EU pollinator monitoring scheme is being developed and will be piloted soon. Citizen science is set to be an important element of the scheme.

[18] https://www.global2000.at/schmetterlings-app
[19] https://www.biodiversity4all.org/
[20] https://butterfly-monitoring.net/
[21] https://www.eea.europa.eu/data-and-maps/figures/european-grassland-butterfly-indicator

FRANCE

The Observatory of Garden Biodiversity gathers citizen science data on butterflies and on bumblebees in private gardens. Opération Papillons[22] asks people with gardens to record the monthly maximum abundance of day-flying butterflies in their garden. About 1,000 gardens are being monitored per year, and more than 1.6 million butterflies have been counted since 2006. Observatoire des Bourdons[23] records monthly maximum abundance data of bumblebees (*Bombus*) in private gardens. About 400 gardens are surveyed each year, a total of 2,200 gardens since 2009.

Join campaigns. Take part in the national bee-count or a local bio-blitz. These campaigns are useful for monitoring abundance.

NETHERLANDS

Nationale Bijentelling[24] (Dutch Bee Count) is a campaign to monitor wild bee abundance and raise awareness of pollinators. Citizens are invited to count bees and wasps in 17 easily identified taxa groups covering honeybees, some big solitary bees, the easily identified bumblebees, two hoverflies that are bumble mimics, and wasps as a group.

Contribute to 'nature calendars' by providing seasonal observations to help track the impacts of climate change.

See further information on citizen science in the annex, and further examples of citizen science for pollinators on the EU Pollinator Information Hive.

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[22] http://www.vigienature.fr/fr/operation-papillons
[23] https://www.sciences-participatives-au-jardin.org/edito/bourdons
[24] https://www.nederlandzoemt.nl/doe-mee/bijentelling/

More information about pollinators and what you can do to help them – Annex I

What are pollinators?

In Europe, pollination is carried out primarily by insects, in particular, bumblebees and solitary bees, hoverflies, other fly species, butterflies, moths, wasps and beetles. In other parts of the world, bats, hummingbirds and lizards can also be pollinators. The western honeybee is one of the best-known pollinators, domesticated and managed by beekeepers for honey production.

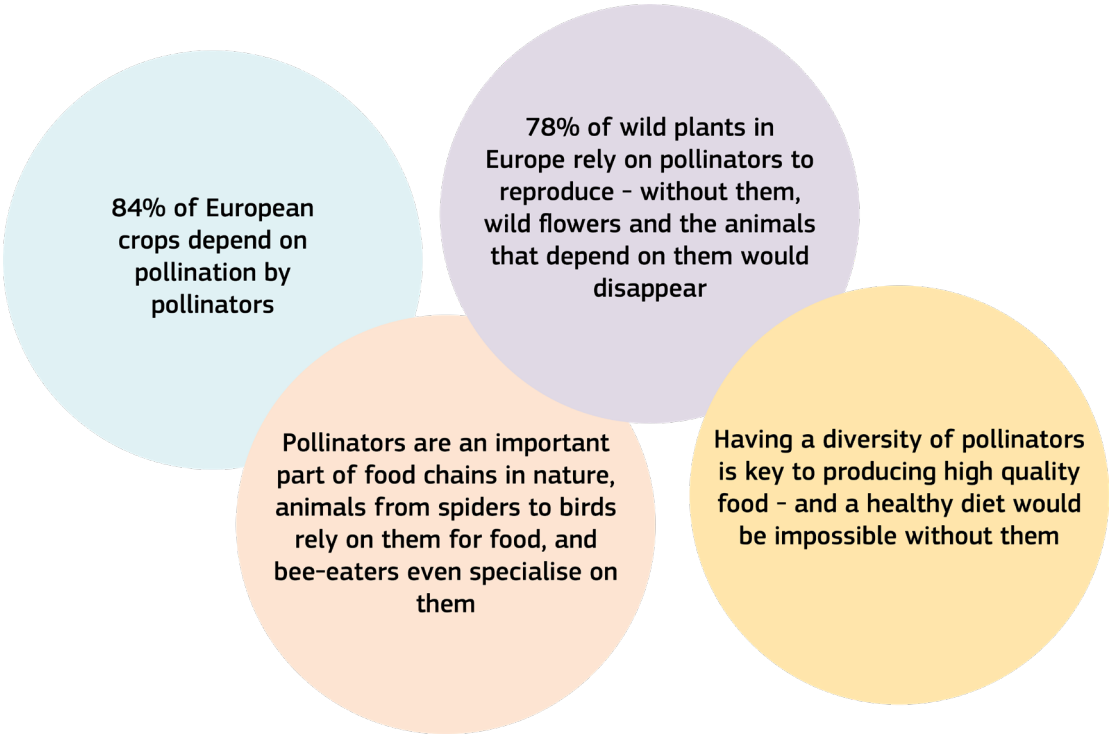
What do pollinators do?

Pollinators help to pollinate crops and wild plants. As they move from flower to flower, feeding on nectar and pollen, they attract pollen to their hairs and move it to the next flower. This enables the plant to reproduce so it can then form seeds and fruits and ultimately produce the next generation of plants. The fruits produced are an important food source for many species — including humans.

Why do pollinators matter?

Pollinators are a crucial part of the ecosystems in which they naturally exist by facilitating plant reproduction, indispensable for human food production and they enhance the beauty of our natural environment. Without pollination services we would lose many fruits, nuts and vegetables from our diets as well as other resources such as vegetable oils, cotton and flax. Besides these material benefits, we receive societal benefits from the services pollinators provide to the natural environment, which improve our health and well-being, outdoor recreation, education, tourism, and culture.

Did you know?



Why are pollinator species declining?

Pollinators face a number of threats and have declined significantly in the last decade. Many species are threatened with extinction. To tackle the decline of pollinators, we need to address the drivers behind it.

Wild pollinators are in strong decline.

- 1 in 10 bee and butterfly species in Europe are facing extinction![25]
- 1 in 3 bee and butterfly species in Europe have declining populations.

However, there are significant gaps in our knowledge. We have very little understanding of over half of Europe's bee species and so cannot say whether they are threatened or not. It is, in fact, possible that up to 60% of bee species are threatened [10][26]. In addition to a decline in species diversity, there is a strong decline in abundance of many of the more common species.

An international team of experts assessed the direct drivers of pollinator declines as: land use change and loss of habitat, intensive agriculture and pesticides, pollution (including light pollution), invasive alien species and climate change [1][27]. The most damaging driver of pollinator loss in Europe has been the loss of wildflowers from our landscapes.

Land use change and loss of habitat. Pollinating insects thrive in natural spaces where a variety of native flowers, grasses, shrubs, and trees are in abundance. When these places are negatively altered by human activities, such as farmland and forest management, urbanization, and transport infrastructure, we reduce the availability of habitat including the native plants and other elements that pollinators need in order to grow, eat, and survive. Too much tidiness and frequent mowing of vegetation in gardens, road verges, green spaces, and other corners has decreased the availability of flowers in our landscapes.

Pesticides are poisonous chemicals designed to keep insects and fungi from damaging plants. Herbicides are poisonous chemicals designed to kill «weeds». Regrettably, these poisons not only eliminate pests and weeds but also harm beneficial insects and plants. The neonicotinoid insecticides were banned partly because of their harm to bees and other insects, but many damaging pesticides are still on sale for use by citizens.

Pollution. Pollinators use their sense of smell to find flowers that can provide them with vital resources – pollen and nectar. Competing odours from air pollution makes this task challenging which can reduce their ability to forage for food. Reduced ability to find food can also result in less reproductive success.

Pollinators that feed primarily at night, such as nocturnal moths, can become confused by artificial light and disoriented in their search for flowers or mates. To reduce the impact of light pollution it is important to reduce lighting used at night, whether that be the number of lights used or the length of time that lights are on. This can be achieved by using timers or motion activated lighting. It also helps to use red wavelength LED lights that exclude the blue and ultraviolet spectrum as this light has the most negative impact on moths (however, bright modern LED lights are damaging in both spectrums) [7].

Invasive alien species. Species of plants and animals that are not native to a region and have been introduced to an area through human activity can sometimes become a threat to native wildlife. Non-native species often have no natural enemies (diseases and predators) that can keep them in check in the area to which they are introduced, and they can then become invasive. Invasive alien species (IAS) compete with native plant species for space, food and other resources. Some provide large amounts of nectar and so are visited by bees, hoverflies, and butterflies, but these plants do not provide any food for the caterpillars and larvae.

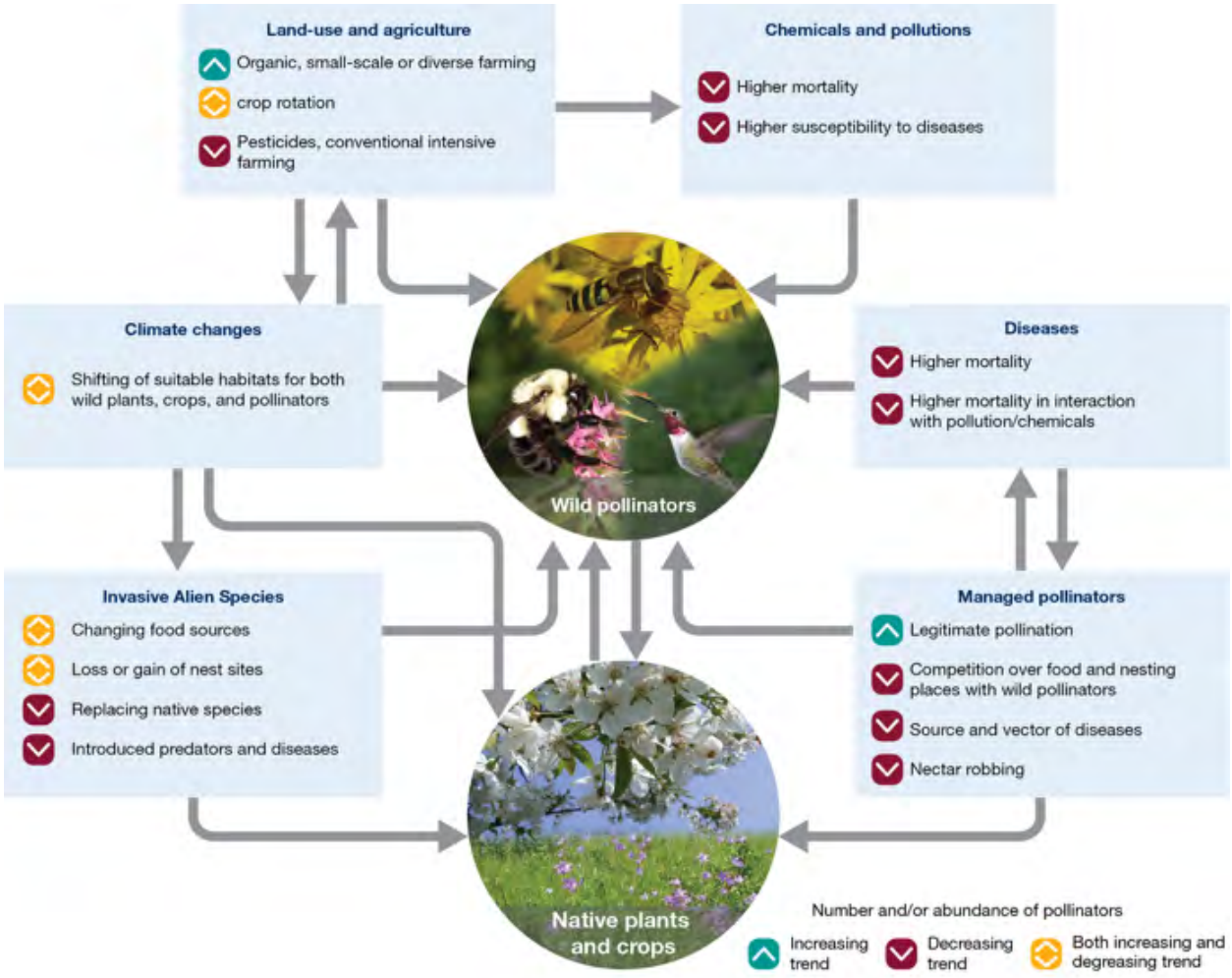
[25] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52018SC0302
[26] The European Red List of Bees is the key information on the status and trends of pollinators at the EU level (and in Europe as a whole). The relevant assessments provided these statistics.
[27] In 2016 the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem. Services (IPBES) published the first global assessment of pollinators and pollination.

Climate change is causing increasing extreme weather and it is altering normal seasonal patterns. Seasonal patterns determine when flowers bloom, when animals migrate and when eggs hatch. If these patterns become disrupted, this can negatively impact pollinators; For example, changing spring temperatures may mean that insects which have specialist food plants emerge before or after their specific flowers are in bloom and they are unable to find enough pollen to reproduce. Drier and hotter summers may also mean that many pollinators starve because plants stop flowering in the drought.

There are still major data gaps on wild pollinator populations and trends. It is very important to fill these gaps and better understand the status of pollinators especially in some parts of Europe like the Mediterranean region.

You can find more information on the EU Pollinator Information Hive[28].

Single and combined impacts of different pressures on pollinators and pollination (source: IPBES [11]).



[28] https://wikis.ec.europa.eu/display/EUPKH/EU+Pollinator+Information+Hive

Creating habitats for pollinators

Different pollinators have different nesting requirements and it is crucial that there are plentiful food sources Pollinating insects also need somewhere to nest and hibernate. Landscape diversity is key to provide for many different species. Habitat features for pollinators wishing to nest or hibernate can include bare ground, walls, dense vegetation, bramble clumps, dense scrub, compost heaps, leaf litter, log piles and can provide important features for nesting and hibernating insects (i.e. hoverflies, bumblebees and butterflies) or even overwintering larvae, pupae and eggs of different species.

Create natural feeding and nesting habitats	• Leave as many areas as wild as possible (nature knows best) • Plant native flower species that provide resources for pollinators • Create and maintain bare earth and sand banks for mining bee nesting • Create suitable nesting habitat for stem-nesting species, for example by cutting back bramble (*Rubus fruticosus*) to expose stems • Leave dead wood, in particular standing dead wood or logs in sunny spots as many cavity nesting species use this habitat (for shelter and nesting) • Encourage a diversity of native plants, including ones we think of as weeds. • Many butterfly and moth species have a specialist relationship with certain plants and with a greater diversity of plants, comes a greater diversity of pollinators!
Create artificial nesting habitats	• Make “bee hotels” for wild pollinators • Insert “bee bricks” for solitary bees in new developments or building extensions/renovations • Drill holes in wood or concrete (for example in concrete fence posts or a wood block attached to a fence) • Install sand planters or other sand-filled features, or stone piles • Make a ’hoverfly lagoon’– a small container filled with leaves and water for hoverfly larvae to develop

Resources on creating pollinator-friendly spaces

- Guide to Plants for Pollinators[29] issued by the Royal Horticultural Society (UK and Ireland)
- Dos and Don’ts for Butterflies of the Habitats Directive[30] by Butterfly Conservation Europe
- Habitat Creation and Management for Pollinators[31] guide including information about diverse, year-round flower sources for pollinators, published by UK CEH
- Creating Wild Pollinator Nesting Habitats[32] and other resources published by the All-Ireland Pollinator Plan
- Förderung von Wildbienen[33] information flyer by WildbienenKataster, Crailisheim, Germany
- Guide to Ecological Green Space Management in Urban and Peri-Urban Areas[34] by URBANBEES
- Guidance on How to Manage Urban Areas for Pollinators[35] by Buglife, UK
- Creating Green Roofs for Invertebrates – A Best Practice Guide[36] by Buglife, UK
- Guide to making hoverfly lagoons – by BuzzClub UK[37]

[29] https://www.rhs.org.uk/science/conservation-biodiversity/wildlife/plants-for-pollinators
[30] https://natureconservation.pensoft.net/articles.php?id=1326
[31] www.ceh.ac.uk/sites/default/files/Habitat%20Management%20and%20Creation%20For%20Pollinators.pdf
[32] https://pollinators.ie/resources/how-to-guide-nesting/
[33] http://www.wildbienen-kataster.de/login/downloads/Arbeitsblatt_Wildbienenschutz.pdf
[34] http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=home.showFile&rep=file&fil=URBANBEES_Management_Plan.pdf
[35] https://cdn.buglife.org.uk/2019/08/managing-urban-areas-for-pollinators_0.pdf
[36] https://cdn.buglife.org.uk/2019/07/Creating-Green-Roofs-for-Invertebrates_Best-practice-guidance.pdf
[37] https://www.thebuzzclub.uk/hoverfly-lagoons

Citizen science as a tool for monitoring and engagement for pollinators

Environmental citizen science can be immensely important for pollinator conservation as it can provide important information about pollinators. Citizen science is beneficial for society too as it provides the opportunity for people to connect with nature, spend time outdoors which is beneficial for your health, learn something new, discover new communities, and be part of something important and positive [12].

The European Citizen Science Organisation defines the Ten principles of citizen science for scientific research[38]. One principle is that both the professional scientists and the citizen scientist should benefit from taking part. A key starting point when setting up a new project should be to understand both the capacity and level of existing knowledge or expertise (e.g. ability to identify insects to species or group level) amongst the citizen scientists taking part, and also the intended outputs of the study or initiative.

You can find examples of citizen science projects for pollinators and more information on the EU Pollinator Information Hive[39].

Resources on citizen science

The European Citizen Science Organisation[40] offers a good collection of guides and resource materials.

- **Ten principles of citizen science for scientific research**[41]

Responsible Research and Innovation[42] – promotes citizen science and provides a new framework for the meaningful participation of civil society in research and innovation

- **How to co-create community-based participatory research**[43]

Guide to Running BioBlitzes[44] - 'Bio' means 'life' and 'Blitz' means 'to do something quickly and intensively' - together they make 'BioBlitz', a collaborative race against the clock to discover as many species of plants, animals and fungi as possible, within a set location, over a defined time period (usually 24 hours).

[38] https://ecsa.citizen-science.net/sites/default/files/ecsa_ten_principles_of_citizen_science.pdf
[39] https://wikis.ec.europa.eu/display/EUPKH/EU+Pollinator+Information+Hive
[40] https://ecsa.citizen-science.net/
[41] https://ecsa.citizen-science.net/sites/default/files/ecsa_ten_principles_of_citizen_science.pdf
[42] https://www.rri-tools.eu/public-engagement
[43] https://www.rri-tools.eu/how-to-stk-csos-co-create-community-based-participatory-research
[44] https://www.nhm.ac.uk/content/dam/nhmwww/take-part/Citizenscience/bioblitz-guide.pdf

Citizens for pollinator conservation – Annex II

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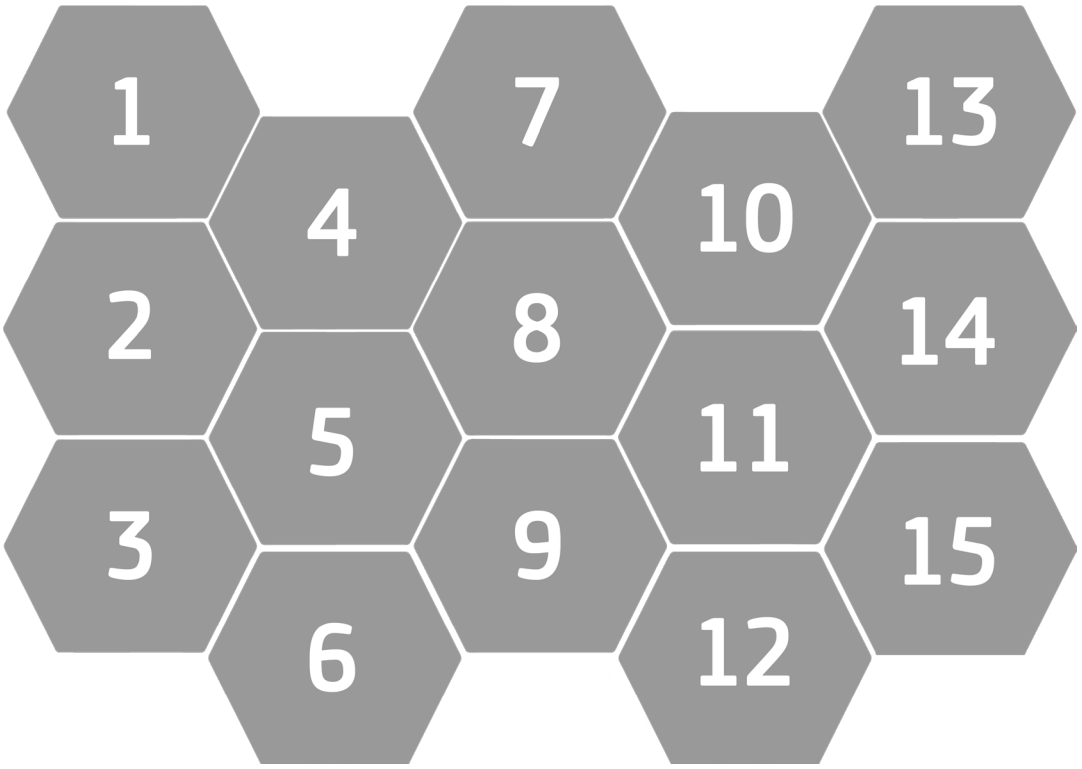
Citizens for pollinator conservation – Annex III



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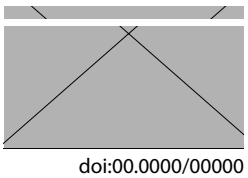

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