BEE CONSERVATION TOOLKIT

EARTH DAY NETWORK

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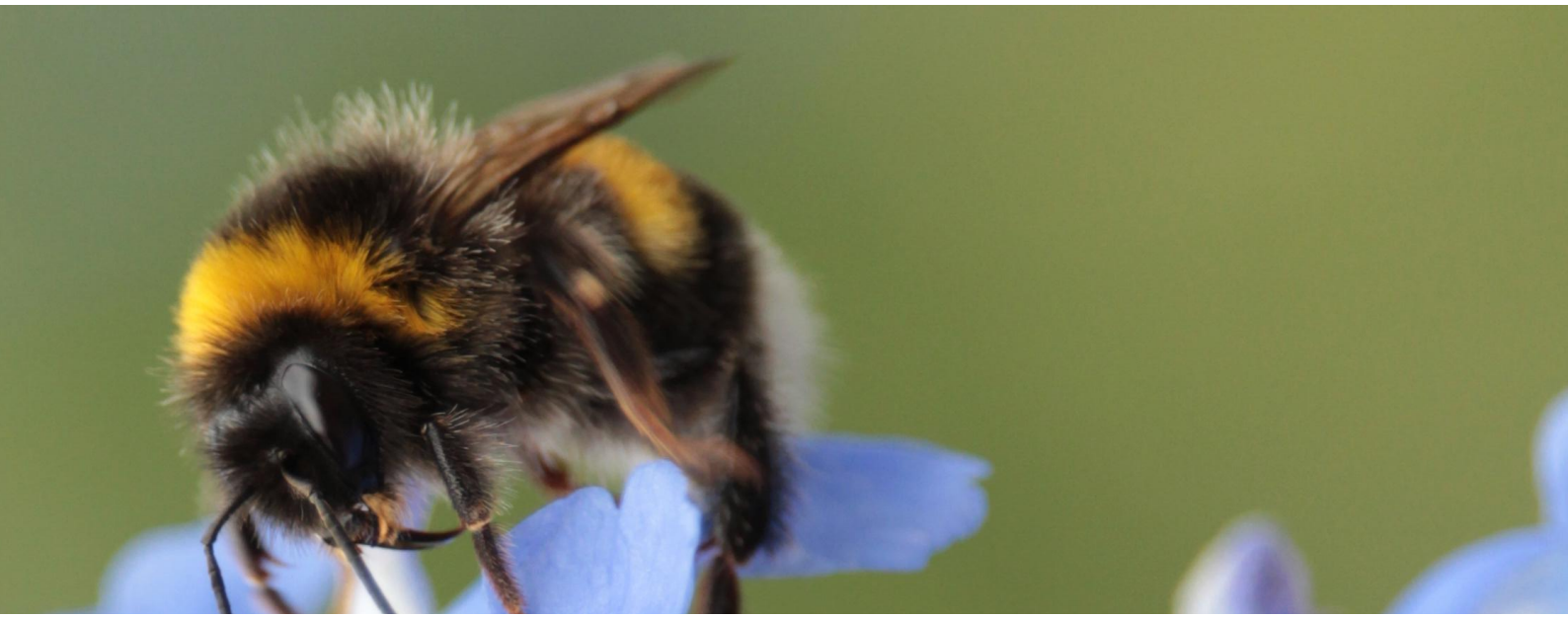
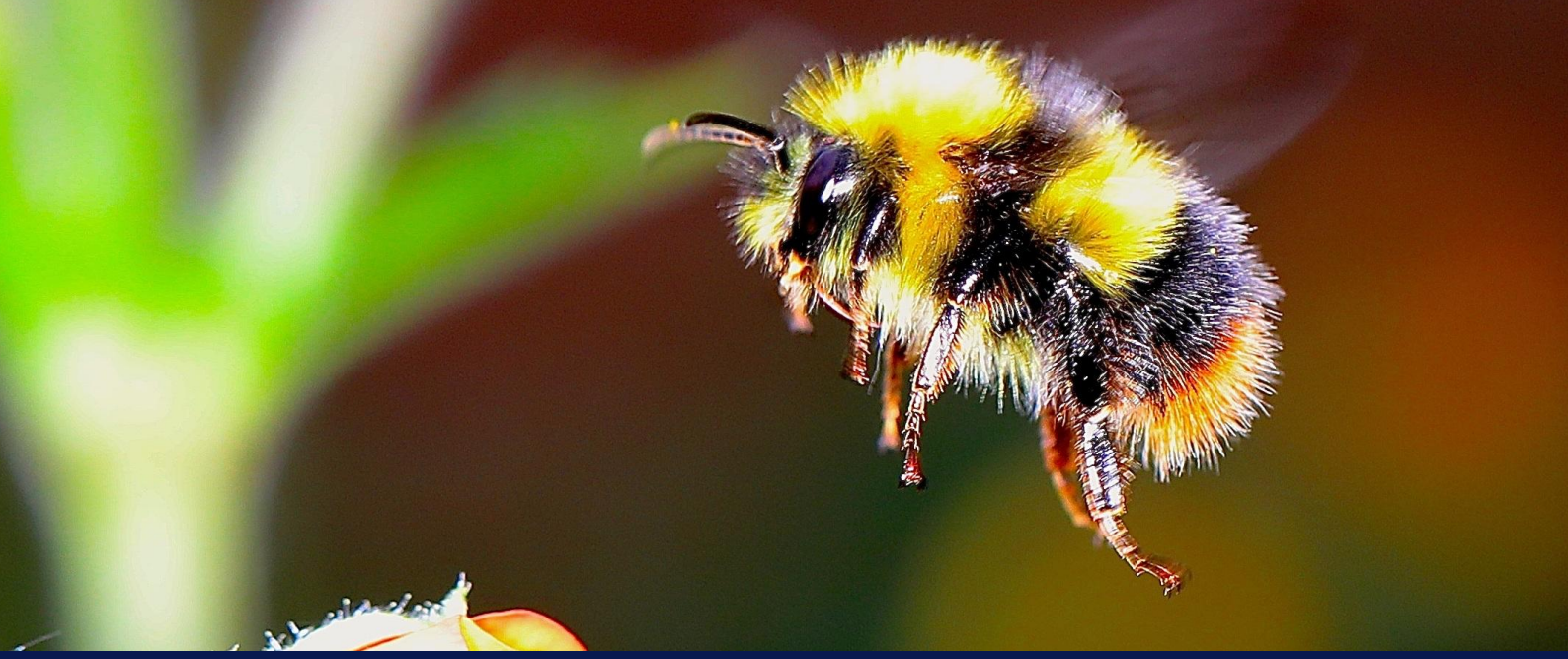
I. IMPORTANCE OF BEES

Bee populations around the world are declining, with many species of bees becoming endangered and in some cases extinct faster than ever before. Humans and bees survival is intertwined, without bees we risk doing significant damage to ourselves and our world's ecosystems.



Humans, plants and animals depend on bees to sustain life. As bee populations decline, the risk that we will lose important processes that bees help to facilitate increases.

Bees are suffering from several threats — among them are disease, climate change, habitat loss and many more. It is important to focus efforts on the conservation of our bees so that humans as well as many other plant and animal species around the world are able to maintain healthy, sustainable lives.



Bees are some of the world's most important pollinators that support our food system and our economy. We rely so much on these pollinators that apiarists, or beekeepers, travel around the country with beehives to pollinate crops! Bee pollination is so important that if we lost them, it would dramatically alter what foods are available to us, changing our diets and threatening access to nutritional food.

Honeybees alone are one of the most important pollinators and are responsible for $15 billion worth of food crops that are consumed and sold, just in the United States.

Generally we rely on pollination from various insect and animal species so heavily that the Food and Agriculture Organization of the United Nations determined pollination supports the production of crops estimated to be valued between US$235 and US$577 billion a year globally.

II. THREATS TO BEES

a. Colony Collapse

Colony Collapse Disorder (CCD) is the disappearance of worker bees from the hive in unusually large amounts. Worker bees are the ones in the social ladder of the hive that take the trip to the flowers and perform the ecosystem service of pollination. With their increased absence, the hive cannot produce as much food to reserve for winter months. Furthermore, less worker bees also means less plants are pollinated, which could have detrimental effects should this phenomena continue to grow. Humans and animals that rely on those plants will increasingly have fewer nuts, seeds and berries to eat, and similarly humans will have both a smaller range and yield of crops.

CCD is a problem with many causes. It's a problem that damages the senses and memories of bees when they are foraging for food. Some of the stressors that damage bees come from farming practices, while others come from climate change and trade practices.

ACTION ALERT

Help scientists track bee populations and monitor where bees are thriving and declining by downloading the Earth Challenge 2020 app, a citizen science project created by Earth Day Network, The Wilson Center and the US State Department.

Check out Earth Challenge 2020's lesson plans that cover topics ranging from insects to plastic pollution and learn how you can make a difference!

II. THREATS TO BEES (cont.)

b. Habitat Loss

Continuous development of cities and suburban areas has rapidly destroyed bee and pollinator habitats globally. Popular urban and residential landscaping has not been designed with wildlife in mind, and suitable places to nest, feed and reproduce can be difficult to find. Yards and gardens have been styled with mulch, nicely mowed lawns and exotic plants.

While these may be aesthetically pleasing, they actively remove areas that are suitable for bee settlement. Woody and leafy hiding spots that serve as excellent spaces for bees are actively stripped into deserts when we coat our natural spaces with grass and mulch.

Moreover, our native pollinators have evolved to pollinate our native plants. By filling our yards with non-native flowers, the mechanisms native bees have developed to pollinate are ineffective and they are unable to feed.

II. THREATS TO BEES (cont.)

c. Invasive Species

Non-native species of plants have a significant impact on a pollinator's ability to function within their environment. Invasive species are species that are native to one part of the world and are transported to another location, which can dramatically disrupt habitats and harm native species.

Invasive species often outcompete native species for light and take over large swaths of land preventing native species from accessing components essential to survival.

We introduce non-native species when we intentionally or unintentionally bring new species into our habitats. This can happen by carrying seeds on the bottom of our shoes as we travel. It can also happen when we purposefully introduce an exotic species for the aesthetic value and they begin to take over native habitat.

II. THREATS TO BEES (cont.)

d. Climate Change

Climate change has already begun to reshape habitats around the world. One way we are seeing this is through the alteration of our seasons where temperature patterns are lasting for longer or shorter periods of time depending on the season. This phenomena results in species that are dependent on consistent temperatures to miss environmental cues. As a result of these seasonal changes, animals like young bees may not be developed fully enough to pollinate flowers that are blooming earlier and earlier in the year.

This remains a significant concern as there is little evidence that bees and other pollinators can adapt quickly enough, unassisted, to match seasonal patterns that have altered due to climate change.

II. THREATS TO BEES (cont.)

e. Pesticides

Pesticides are used for a variety of purposes ranging from eliminating pests in backyard gardens to large scale agricultural productions. Pesticides are designed to be able to kill insects that harm crops, unfortunately bees are also heavily effected by pesticides. Pesticides can kill bees, either through direct contact or through transporting contaminated pollen. The latter puts the whole colony at risk.

Additionally, pesticides often leach into surrounding environments as well as groundwater and harm far more than the intended pest.

- **Herbicides**

Weed killer herbicides are killing bees by weakening insects immune system, resulting in bees becoming more vulnerable to harmful bacteria that harbor harmful diseases. Even commonly used weed killers such as Roundup have been proven to be lethal to bees.

- **Insecticides**

Insecticides effectively convert plants into poison. These products are lethal to all insects and rarely harm only the intended critters.

  - **Neonicotinoids**

  This class of insecticide poses a threat to both managed and wild bees. The plant absorbs the chemicals and effectively becomes poisonous to insects. However, the pesticide is also absorbed by pollen and bees are harmed during pollination.

III. HOW YOU CAN HELP

a. Individual Action

Become a Citizen Scientist with Earth Challenge 2020!

Citizen science is a meaningful way to engage students in the scientific method, contribute to meaningful research and demonstrate real-world applications of learning.

Pesticide Alternatives

Use alternatives to synthetically made pesticides! You can scatter chili pepper flakes, bits of oil or soap, tomato leaves or garlic around your plants to keep various critters at bay.

Civic action

Want to do more? Sign petitions that ban the use of bee-harming pesticides like neonicotinoids.

Vote with your wallet!

Don't buy synthetically made pesticides or herbicides, and educate others on the ways these can harm your local environments! Sign Earth Day's pesticide pledge.

Check out our toolkit on how to plant a pollinator garden!

III. HOW YOU CAN HELP(cont.)

b. Importance of Policy

Individual action is helpful but the role of effective public policy also plays an important part in reducing the commercial use of harmful pesticides. In the United States, the Environmental Protection Agency (EPA) is responsible for safeguarding the public from harmful pesticides. Specifically, the Food Quality Protection Act of 1996 requires the EPA to make regulations regarding long-term pesticide exposure found in water and on land. However, in the 23 years since the unanimous passage of this law, the EPA has failed to keep up with the growing threat of pesticides. To illustrate just how much the EPA is underperforming in its obligation to public health, the agency in March of 2017 declined to ban a dangerous chemical, Chlorpyrifos, despite their own research telling them that the pesticide posed adverse health-risks.

Fortunately, other countries are starting to realize just how harmful pesticides are for bees. In 2018, the European Union banned all bee-harming pesticides. This means that even the most widely used pesticides and insecticides in the world will be banned from use within the European Union. This is a huge stride in the right direction in mitigating bee decline and will help bee populations recover in the European Union. The EPA has also had debates over banning pesticides and they have decided not to. This is an issue for the bee's health and for our health. The U.S. should follow the example of the E.U.

IV. LESSON PLANS

Insect Hotels: A Room with a View

In this activity, students will use their understanding of the importance of pollinators to create new habitats for them. Students can also learn about insects and pollinators local to their area to understand what kinds of creatures might be staying in their new homes!

Dance Like a Bee

This activity is designed for students to understand how bees communicate and open their minds to different types of communication. It also presents a challenge for each pair to improve their teamwork skills.

Pollination 101

Students will use their understanding of pollination to mimic the process. They will connect this process to the broader importance of insects as the providers of ecosystem services. They will also be able to explain why insect biodiversity is declining and what problems this could create.

V. ADDITIONAL RESOURCES

LESSON PLANS

K-3

Africanized Honey Bees on the Move (The University of Arizona)

This resource leads to a variety of lesson plans about the Africanized honey bee.

4-6

Pollination Parade (Pollinator Partnership)

This lesson teaches students about the types of flowers bees are attracted to and why through a hands-on, interactive lesson.

6-8

Pollinator Live (Pollinator Partnership)

Check out videos on pollination, pollinators in your back yard and more!

6-12

Trouble in the Hive: Researching the Decimation of Honey Bee Colonies (The New York Times)

This article on declining bee populations provides questions to be answered by students at the end once they have thoroughly read through the article.once they have finished reading it.

V. ADDITIONAL RESOURCES(cont.)

ARTICLES

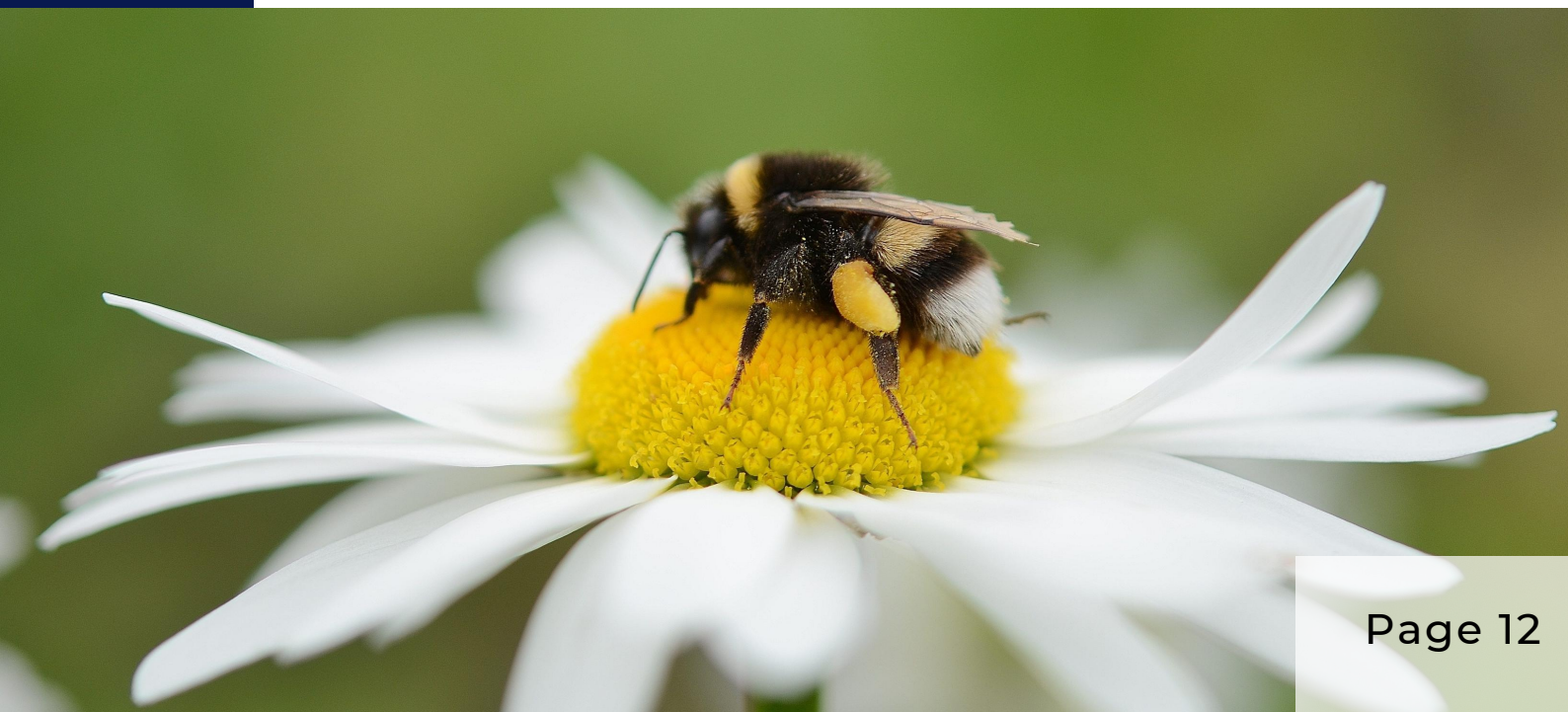
Will We Still Have Fruit if Bees Die-Off? – WIRED
This article discusses a region in China that has farms that produce fruit from 100% hand pollination. It also gives a startling picture into the future if the bee Decline were to continue.

Save the Bees - Greenpeace
This Greenpeace article provides statistical data surrounding bee losses related to Colony Collapse Disorder.

VIDEOS

Why do we Need Bees? – Earth Rangers
This video explains the role bees play in producing food. The process of bee pollination is also demonstrated by the video.

TED Talk: Why Bees are Disappearing – Marla Spivak
This bee researcher tells the unfortunate tale of the bee decline, the story of what has happened over and over again, and what this current era of bee decline looks like.



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Developed by Anna Kuhne, Christopher Bresnahan, Kira Heeschen, Rachel Weisbrot, Tracey Ritchie and Katie Wood.

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For more information, email species@earthday.org