

I was attracted to the topic of bees when I walked out of my dorm room one morning at the Oxbow School and saw dead bees scattered around outside. I then began noticing newly dead bees outside my dorm every morning. I asked one of my teachers why there were so many dead bees, and he replied that bees are dying in general. I decided to research this for an informational pamphlet I had to write for school. By researching bees, I learned about some of their struggles,



and I began to realize how important bees actually are. I personally rely on bees, and so does every other human, even though not everyone realizes it. I decided I wanted to know more about bees, so I am determined to get the message out about bees and their predicament.

Bees are dying, and humans are to blame. This problem can be looked at from the perspective of a European honeybee (*Apis mellifera*. queen bee. She is slightly larger than the other members of the hive, but still hard to pick out from the 30,000 members of her healthy, but small, hive (Jones, Richard A., and Sharon 94-97). Each member has a job, and each job is done with care.

The small, female worker bees fly in and out of the hive, pollinating plants and bringing that pollen back to be used as food. Pollen from each flower is rubbed off onto bees and on the barbs of their back legs. From here it is transferred into baskets on their back legs, or rubbed off onto a different flower (Jones, Richard A., and Sharon 94-97). This exchange of pollen from one flower to another is pollination, and is also beneficial to the bees. The pollen in the leg baskets is brought back to the hive to be used as food. However, pollen is not all the hive requires for food. These western honeybees make honey to use as food. To make this, worker bees suck up nectar from the flowers using their long mouths. The nectar is stored in their stomachs. It is then regurgitated and stored in the wax cells. Here it sits, while the worker bees fan it with their wings, until the water in the nectar has evaporated and the nectar has become honey ("Worker Bee"; Keilty). We know this new material as honeycomb. The female worker bees bring water to the hive, create the wax cells that end up being loaded with nectar, take care of the larvae, and over all, protect the hive. The queen watches over this, but she does not take part. Her job is to populate the colony. The drone bees, or males, are largely outnumbered by the worker bees. Their job is to mate with the queen. Her world is very uniform. Everyone has a job, including her. They are not individuals, but rather a giant machine where all the gears have their place and work together to make the machine function. Bees are a type of superorganism, in which they work together so perfectly that all the bees in a hive function as a giant single organism (Keilty).

One normal day, all the bees began work once the sun came up like usual, but the workers didn't come back to the hive. The queen doesn't know what is happening and why all her ladies in waiting have left her. She is now in a close to empty hive full of honey and larvae or young bees, which were left behind. She works harder than she's ever worked to repopulate the hive, but her hive barely scrapes by, and the worker bees never return. Little does she know that

the hive next to her, and most of the hives in her general area, had the same thing happen to them. One day, their queens woke up with a bustling hive, and went to bed with it being close to empty. How could *she* know that this is happening to European beehives all over the World. To her, the machine is broken. Her children are gone. She needs to replenish the cogs in the machine.

We, have give this tragedy a name. It's called Colony Collapse Disorder, and it's sweeping the Globe. Bees are sick, disappearing, and dying, but why? The answer is known. We are slowly poisoning them every time we spray our crops with pesticides and over feed our crops with fertilizer. To save the bees, someone or something has to change, and it's not the queen bee (Jones, Richard A., and Sharon 94-97). Our health, the health of bees, and the health of the natural world are tightly intertwined. What we do effects bees, and comes back to effect our lives in return.

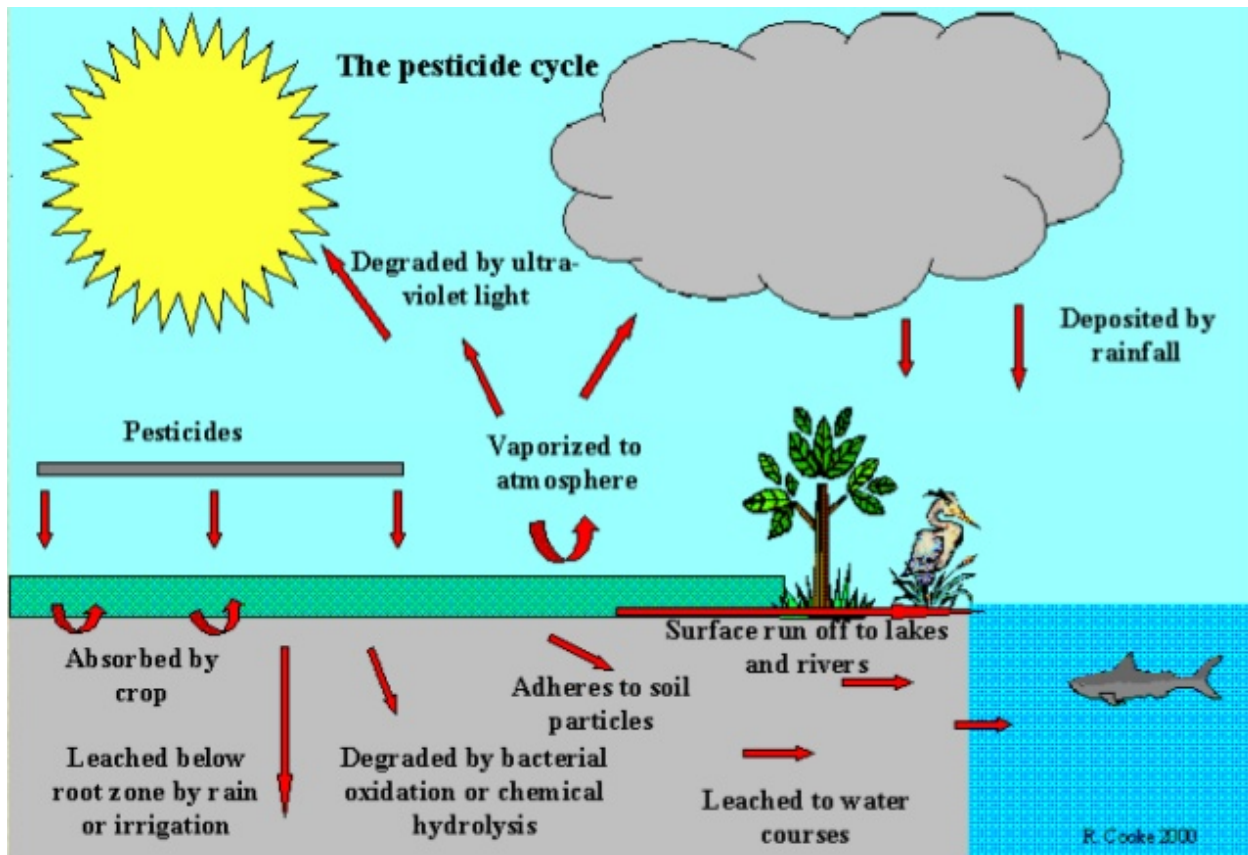
Why are bees so important? Bees keep the world turning. They are magnificent creatures. Their eyes contain 6,000 hexagonal facets, and they can identify the direction of light polarization. Bees have antennae that are used as feelers, and pick up on sound vibrations. Bees can communicate through special dances that they perform (Jones, Richard A., and Sharon 94-97). They are amazing organisms in themselves, but bees also keep the earth alive. They pollinate many plants, and by doing this, the plants are healthier and able to reproduce. Bees keep nature alive, and they help humans too. "One third of the human diet comes from flowering crops, and honeybees are responsible for pollinating about 80 per cent of them" ("What's Happening to Our Bees"). The majority of our diet comes from food pollinated by bees. People also harvest honey, a sweet substance honeybees create, to use as food and sweetener. In fact, honey and honeycomb have lots of uses to humans. Without bees, our world would be a much different place, especially since humans rely on bees in such a dire way. Unfortunately, a world without bees is not as far off as people think.

It is a fact that bees are in danger, but how bad is the problem? The number of European honeybees has been dropping in the United States of America, and in other parts of the world. There are forty percent less European honeybees in the United States that there were in 2006. There are twenty-five percent less honeybees in Europe than there were in 1985. There are forty-five percent less honeybees in the United Kingdom than there were in 2012 ("The Bees in Decline"). The European honeybees aren't just dying, they are disappearing. The first person to notice this strange disappearance of bees was David Hackenberg. One day, when he left his bee hives in a field, they were full, but when he returned, many of the bees were missing from the hives, and they never returned. The missing bees were worker bees, but the queen, the young bees, the larvae, and the honey, along with a handful of the colony, were left behind. This strange event has begun happening to many European honeybee hives in North America, and is known as Colony Collapse Disorder, or CCD. This phenomena can happen in just a couple hours (Langworthy). "CCD is, a serious problem but it must be looked at in perspective. A US survey taken in the Autumn of 2006 and the Spring of 2007 showed losses at 31%, this compares with 35% over 2007 – 2008. There were enough bees to pollinate crops in 2007 and 2008 but obviously on going losses cannot be sustained indefinitely" ("What's Happening to Our Bees"). CCD is threatening the independent hives, along with the commercial hives. It is a serious problem, and humans must take serious action.

Scientists have looked hard into what causes CCD. This disorder came to the United States in 2006. Because of the constant introduction of new pathogens and pesticides, bees have been becoming weaker over the last twenty-five to thirty years. The weakened state of bees could

be contributing to CCD, but isn't the only reason that the European honeybee hives are experiencing CCD. The condition is also caused by herbicides, viruses, bacteria, mites and pests, lack of food, and genetically modified crops ("What's Happening to Our Bees"). Even though each of these problems contributes to CCD, its main cause is pesticides.

There are many different kinds of pesticides that are used to ward off pests that want to eat crops, but no matter what producers or the media says, no pesticides are truly good for the environment, or for bees. Every different type of pest requires a different type of pesticide to kill it. Most of the time, pests can develop a resistance to the pesticide made to kill them, and then better pesticides must be made by scientists to kill the newer, greater pests (Spooner). It is a ever worsening cycle, and it must end. Organopesticides are one type of pesticide that are mostly toxic for the first couple days, and then breaks down. They can cause damage to brain cells. Chlorinated Hydrocarbons are another type of pesticides. They don't break down easily, and can lead to cancer. Inorganic Pesticides are highly toxic, and don't really break down. They cycle through the pesticide cycle, which is where they soak into the soil and circulate in the ecosystem. Inorganic pesticides enter the food chain and poison bees, other bugs, animals, and eventually us (Spooner). POPs, or dangerous organic compounds, categories the synthetic pesticides that circle through the ecosystem. These pesticides, or poisons, can become more concentrated as they move further up the food chain. Pesticides are in the environment, and weaken the immune systems and poison bees.



(Image 2: The pesticide cycle)

Mites, Viruses, bacteria and pathogens also cause Colony Collapse Disorder. Beekeepers and scientists have noticed that the overall stress of a hive has gone up. The overall stress of the bees, and the pesticides circulating throughout the environment, weakens their immune systems. This makes the bees more susceptible to viruses, and bacteria (“What’s Happening to Our Bees”). One serious disease that is taken up by European honeybees is American Foulbrood. This disease has to be treated against before the bees catch it, because once they do, there is no cure and they will die. If a commercial hive gets this disease, all the bees and the structure that makes up their hive must be burned. Bees can get American Foulbrood by being exposed to *Bacillus larvae* bacteria, which dwells in the food that the worker bees feed to their larvae (Hubbell 71-73). Another major disease that threatens European honeybees is Nosema. This disease kills bees with spores that attack the cells in their intestines (“What’s Happening to Our Bees”). Nonetheless, Bees are subjected to different types of mites. European honeybees are tormented by the Varroa mite, a mite that sucks the blood of bees. The Varroa mite is brown or tan, and in comparison to bees, rather large. It lays eggs inside the compartments that store the larvae, and when the eggs hatch, the mite(s) attaches onto the outside of the larvae. Healthy, mature bees that get Varroa mites are able to scrape them off or get rid of them. Sadly, since the commercial honeybees are weak, they can’t do this (Keilty). By not using pesticides on crops and lowering the general stress of commercial honeybees, humans can prevent bees from having a weaker immune system and from getting sick, acquiring mites, and dying.

Malnutrition can cause CCD, and lead to other problems. Malnutrition in bees is brought about by drought, pesticides, the disappearance of their favorite pollinating plants, and commercial beekeepers synthetically feeding bees over the winter and fall months (“What’s Happening to Our Bees”). Commercial beekeepers also give pharmaceutical products to their bees to protect them from viruses and mites and to medicate them. These products aren’t all tested, can easily be overdosed to bees, and are just one more unnatural substance to add to the bees’ systems.

Genetically Modified crops are also a problem. Crops are genetically modified so that they can withstand greater amounts of pesticides and fertilizer. As more pests build up a tolerance to pesticides, scientists create stronger pesticides. Naturally grown crops can’t withstand the amount of pesticides or nitrogen in the soil from fertilizers. By making plants that can withstand more fertilizer and pesticides, farmers and scientists can ensure that pests won’t eat the plants. These plants lower bees’ immune systems when bees pollinate them because of all the poisons (Keilty).

Global Warming is also causing bees to not get as much nutrients and food that they need, and it effects the plants that the bees pollinate. Due to the changing temperatures and weather caused by Global Warming, bees end up hibernating for the wrong amount of time and miss the flowers when they are in bloom. This causes the bees to not get the pollen and nectar from the flowers, and the flowers to not get pollinated (“What if bees went extinct?”).

Bees are disappearing at an alarming rate, but humans aren’t truly prepared for a life without bees. Honeybees alone maintain thirty million dollars per year in crops. Our food industries would loose millions of dollars and crops if all the honeybees die. The crops that would die without the bees wouldn’t be the only life affected. The animals that ate those plants would also die. This pattern would work its way up the food chain and affect all the animals and other plants as well. Since there are around seven billion people living in this world today, we need all the plants and crops we are growing to sustain the population, and still there is hunger and starvation in the world. If honeybees were to die, humans would have to start hand-



pollinating crops. This involves the tedious activity of spreading pollen on each flower by hand. Certain places around the world, including China, have already had to start hand pollinating plants do to the lack of bees, wild or domesticated (“What if Bees Went Extinct?”). Not only would we have to hand pollinated plants, but without bees, our diets would be extremely limited, and we wouldn’t get to eat most of the food we love today. Conversely, Scientists have discovered that sixty-five million years ago, there was a mass extinction of bees all around the world, which resembles the predicament we might find ourselves in soon, and the bees were able to bounce back. However, there was also a lack of pesticides back then, and many wild flower fields. Today, the bees are dying out for different reasons, so there is no reassurance that they will bounce back (What if Bees Went Extinct?). Something needs to be done.

To help save the bees, humans need to spring into action. We need to stop using pesticides on our crops and gardens. Just because a pesticide says it is organic or natural doesn’t mean it is good for the earth. It is still a foreign, manmade substance being fed to our plants, bugs, animals, and ourselves (Spooner). We need to leave the wildflower fields alone, instead of clearing those fields to use as agriculture land, and we need to plant favorite pollinator plants for the European honeybee, and bees in general. There are hundreds of plants we can plant for the bees in the state of California, including Wild Lilac, West Redbud, Thickseed, Wild Heliotrope, Catnip, Toadflax, California Poppy, Mint, Skyflower, Lavender, Spearmint, Russian Sage, Black-eyed Susan, Goldenrod, Thyme, and many others (“Gardening for Bees”).



(Image 3: Wild Lilac)



(Image 4: Thyme)

To find out what local plants grow in each region or area, check the city website or a nearby plant nursery. To help bees, we can also start new hives. To do this, all that is needed is a good case or hive, and a package of bees. Sometimes wild bees will even take up residence in an empty hive. A man-made hive can be a safer place for bees than an open or wild hive, and it can allow for the colony to expand and increase in numbers. The first step to saving the bees is to

care about what happens to them, and then to spread the word about colony collapse and the disappearance of the European honeybees.

Honeybees are one of the top pollinators of commercial and natural plants and crops. However, from 2006 to the present, beekeepers in the United States of America have lost about thirty percent of their hives each winter. This is much higher than it was before 2006. CCD is affecting bees everywhere, and its only getting worse. In the past seventy years, the United Kingdom has lost ninety-seven percent of their flower grasslands. These are favorite pollinating areas for the European honeybee and other species of bees (“What if Bees Went Extinct?”). These honeybees pollinate crops that feed humans and plants that feed animals. Their lives are in danger, and so are ours. Our health and their health are intertwined. Bees are disappearing due to pesticides, pests, and illnesses. The time to change the outcome of our world is now. Just by planting a honeybee friendly plant in your back yard, rejecting plants that were subjected to pesticides, and refusing to use pesticides on your own yard or plants, you can help save the bees. We are bee, and it’s about time that we’ve started acting like it.

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- Image 3: Wild Lilac < <http://livrancourt.com/wp/wp-content/uploads/2013/05/wild-lilac-5.25.13.jpg>>
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