

Avoiding the Crisis of Bee Extinction

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People fail to realize the impact and importance of bees to society as a whole. Bees are vital to all life because they perform nearly eighty percent of worldwide pollination, but especially to human life because they are helpful and important in the production of food.<sup>1</sup> To put it in perspective, bees pollinate about one-third of the food that is eaten by people. Precisely seventy out of one-hundred of the most human eaten crops- ninety percent of which contribute to the supply of the world's nutrition- are pollinated bees.<sup>2</sup> The honeybee population is declining at a rapid rate for numerous reasons. Laurence Parker, the author of *Keeping the Bees*, explained that there is a continuous decline in the population of honeybees that if continued will lead to the complete extinction of them sometime between 2040 and 2060.<sup>3</sup> There are several problems that have contributed to this downward trend of honeybees; three of them being climate change, pollution, habitat loss and fragmentation. This paper intends to explain them as well as ways to prevent further harm and introduce conservation methods and adaptations in order to save the honeybees from extinction.

The loss of their physical environment has been detrimental to the honeybee population. There were once extensive areas, consisting of grasslands and forests, that have now been replaced with agricultural lands. Because of the mass production of agriculture, some ecosystems have been completely wiped out, which lead to the extinction of thousands of species. An example that was given by Packer was the oak savannah, which now covers less than 0.02 percent of the area that it once occupied because of the shift to European-style agriculture.<sup>4</sup> European-style agriculture tends to consist of the planting of fields of monocultures within grids. This creates a lack of biodiversity by only growing one type of plant and it consequently

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<sup>1</sup> Green Peace, "Save the Bees!" Green Peace USA

<sup>2</sup> Green Peace, "Save the Bees!"

<sup>3</sup> Laurence Packer, *Keeping the Bees*, HarperCollins, 2010.

<sup>4</sup> Packer, *Keeping the Bees*

weakens ecosystems to possible threats. The growing of monocultures affects bees because farmers usually do not grow plants that double in use as bee food. This can be related to honeybees because their land has been converted to agricultural land in the same way.

Due to land conversion, there has been vanishing of wildlife reservation lands that are meant to protect the lives of honeybees. In fact, the Northern Great Plains of the Dakotas is known to be America's hot spot for commercial beekeeping, and it is where over one million honeybees spend their summers.<sup>5</sup> While in the Dakota grasslands, the honeybees feast on the pollen and nectar from nearby native wildflowers and other plants. From 2006 to 2016, more than half of the conservation lands near the bee colonies were converted into agriculture for row crops like soybeans and corn, which hold no food for bees.<sup>6</sup> The area has lost approximately six hundred square miles of bee habitat which has led to them having a difficult time finding food and, consequently, they are less likely to survive the winter.<sup>7</sup> Humans are the reason that honeybees no longer have sufficient qualities of land to spend their summers, and they also do not have enough food because these spaces have been converted to better accommodate human needs.

Another issue with the physical environment inhabited by bees is the degradation and erosion of soil. The clearing of forests for agriculture and the creation of pathways through the woodlands has impacted the honeybees in both positive and negative ways. It is positive because it provided better-suited habitats by providing open and sunny spaces for the bees. Open and sunny spaces are important for bees because these are the places that spaces where ground-

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<sup>5</sup> Associated Press, "The Last Honeybee Refuge in the US Is Disappearing," New York Post, July 2018.

<sup>6</sup> Associated Press. "The Last Honeybee Refuge in the US Is Disappearing."

<sup>7</sup> Associated Press. "The Last Honeybee Refuge in the US Is Disappearing."

nesting bees can create their nests because they are warm enough to incubate their eggs. Before the lands were cleared, the bees were restricted to create nests in places that were not as safe for their eggs. The negative aspects are quite obvious seeing as how humans have caused them to be on the verge of extinction. An example would be the previously mentioned conversion of land; the removal of the trees is mostly for the construction of European-style agriculture. The removal of trees has also caused increases in soil erosion and water pollution, and the use of pesticides on farms has led to soil degradation and pollution. The conversion to agriculture not only takes away their land, but it also adds in more threats like pesticides.

According to Green Peace, in the last four years, the chemical industry has spent nearly 11.2 million dollars on public relation initiatives to broadcast that they are not at fault for the decline of honeybees.<sup>8</sup> The chemical industry releases hundreds of pesticides but there are seven that are correlated with the steep decline of bees. Three of the seven deadly pesticides- nicotine-based clothianidin, imidacloprid, and thiamethoxam- have been banned in Europe because they have been found to be high acute risks for bees.<sup>9</sup> Biologists have even found nearly two hundred chemical residues in bee pollen that they have labeled as a deadly “pesticide cocktail.” Pesticides can be considered pollutants to bees because when introduced into their environment it causes them to be less effective and can lead to abnormalities and death. Peter Kevan, who conducted a study on pesticides and bees, found that on average there were four times as many pollinators when removed from the pesticide area.<sup>10</sup> There were three times as many pollinators in an intermediate area, but the pesticide area had a consist number of reduced pollinators after the spraying of pesticides for several years. Those bees had more than twenty-five times as much

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<sup>8</sup> Green Peace, “Save the Bees!”

<sup>9</sup> Green Peace, “Save the Bees!”

<sup>10</sup> Packer, *Keeping the Bees*

pesticide in their bodies than the other bees.<sup>11</sup> This study shows how much pesticides truly can affect bees because it proved the correlation of pesticides and bee population reduction as well as showing the effects of pesticides in their bodies.

Pesticides are not the only type of pollution that negatively effects the honeybees, there is also air pollution which is the main causal factor in climate change. Climate change can be described as a change in regional and global climate patterns and it is usually attributed to carbon emission and fossil fuel use. According to Packer, there are predictions that in the next fifty years climate change will have caused sixty percent of the planet's species to have no viable habitats remaining.<sup>12</sup> Climate change affects habitat loss, shifting temperatures, and can make honeybees more susceptible to disease. Habitat loss can be accelerated by climate change because bees begin to fail to migrate to cooler areas and establish their new hives, possibly because the temperature is already cooler in a place that it would not usually be. This has caused bee territories to shrink by nearly two hundred miles in North America and Europe.<sup>13</sup> Shifting temperatures negatively affect bees because it can cause a mismatch in seasonal timing. This means that bees may miss the flowering of plants and the chance to pollinate them because warm weather brought spring quicker than usual. This is significant because a small mismatch of three to six days can cause bees to have a short window to pollinate before their health is negatively affected.<sup>14</sup> Lastly, parasites have been proven to be more prevalent in higher temperatures so as the weather continues to warm, more bees will become infected with parasites and colonies can fall to disease.

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<sup>11</sup> Packer, *Keeping the Bees*

<sup>12</sup> Packer, *Keeping the Bees*, HarperCollins, 2010.

<sup>13</sup> Green Peace, "Save the Bees!" Greenpeace USA.

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Very few people care about issues when they don't see it as having a direct effect on their daily lives. Therefore, it is important to connect environmental issues to human life in order to make conservation impactful. Without bees, the human race can expect to lose access to many foods that they have been accustomed to producing. The loss of pollinating bees would result in an estimated decline of thirty-three percent in coffee beans, which would mean there would be much less coffee available in Starbucks every morning.<sup>15</sup> People will still be able to get their calories without the pollinators because of staple crops, but overall health would decrease because of the lack of dietary diversity that nutritionists have proven to be important to health. Crops that can be propagated without pollinators will survive, of course, but they would suffer from a lack of genetic variability which would lead to less biodiversity and a higher risk of disease wiping out this species. The absence of bees will not only affect plant consumption of humans, but they will also affect meat consumption because many of the animals consumed by humans live off of a plant and grass-based diet.

The significance of honeybees needs to be realized and more people need to be educated before they go extinct and humankind is forced to change their diets completely. However, humankind will not be the only species to be affected by the extinction of bees. The loss of bees would result in catastrophic cascades through the terrestrial ecosystems of the world and cause a collapse of the food web. Most people do not understand how important the existence of one species is to another; if bees were to disappear, flowering plants would follow closely after, and the cascading effect it creates would cause countless other species that are dependent on

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<sup>15</sup> Packer, *Keeping the Bees*

flowering plants to disappear as well due to lack of food. This shows that the extinction of bees can affect humans in both direct and indirect ways.

There are many social and environmental adaptations that can be enacted within society. Starting with social adaptations, Green Peace is a global organization that exposes environmental issues and promotes solutions to them. They have a page in which people can “take action” and reach out to their elected official about how significant the deaths of bees are while also trying to convince them of the importance of their protection. This is an important method of conservation when knowing that the Trump administration is pushing for the cancellation of the Endangered Species Act and the Environmental Protection Agency, both of which protect several species of bees. Americans need to push for more legislation for the conservation of honeybee hotspot areas because habitat fragmentation heavily contributes to the decline of bee populations. Humankind needs to adapt to be less self-centered and start to realize that they share the planet with millions of other species and that they are the main cause in the demise of hundreds of species each year. Preserving their wild habitat should be one of the first adaptations people take because it can immediately improve bee populations.

The preservation of bee habitats can be achieved through legislation as previously mentioned, but it can also be achieved through ecological agriculture. Ecological farming is a new policy trend that aims to stabilize human food production while also preserving wild habitats and protecting the bees. This type of agriculture can end soil degradation, erosion, and pollution by restoring soil nutrients through natural compost and by avoiding large monocrop cultures.<sup>16</sup> It can avoid pollution by pesticides and halt the use of chemical fertilizers because it

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<sup>16</sup> Green Peace, “Save the Bees!”

is an organic model of farming in which these things are not allowed. This is extremely important because pesticides poison bees in alarming amounts by attacking their immune system and causing development defects in their offspring which weakens the current and future populations. Banning pesticide use has been proven to be effective in rehabilitating bee colonies by Kevan's research which showed that once pesticide spraying was discontinued the bee populations were able to recover.<sup>17</sup>

There are also some small-scale adaptations that can be used to help rejuvenate honeybee populations. Firstly, people can plant small pollinator gardens in their yards or window boxes. This garden should include flowers like anthers and umbellifers which have easily accessible pollen, so they are useful to a larger number of bees. It is most important to grow native flowers, but if one would rather plant fruits or vegetables that can be helpful as well. Some examples of pollinated fruits and vegetables are tomatoes, squash, strawberries, and apples, as well as various beans. It is also important to have a diverse garden because bees can not solely survive by consuming one plant. Another small-scale adaptation is the creation of nesting sites for bees. This can be done by leaving old cane plants or bamboo plants in place, or better, cutting and placing them along a fence or tree borough. A personal adaptation could be to start supporting organic farming more because it is a bee friendly way of growing food and they do not use pesticides. One last adaptation to think about would be simply not walking on the grass in attempts to not compress the ground because wild grass cannot grow, and bees cannot nest there.

Adaptations for climate change are much trickier because most of the world is still dependent on fossil fuel use. About eighty percent of the world's primary energy use depends on

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<sup>17</sup> Laurence Packer, *Keeping the Bees*

fossil fuels. Although fossil fuel use is projected to fall by four percent in the next twenty years, that simply is not enough to curb the damage that has been done to the Earth via emissions. It is hard to shift from fossil fuels on a large scale because they are the cheapest option available and the government loves to save money even at the expense of the environment. It can happen at an individual level, like the many people who own Teslas and have solar panels on their property. However, these options are expensive and not everyone is equipped with the funds to use renewable options.

In conclusion, saving honeybees is far from impossible. There are several ways to prevent the extinction of such an important species. Bees are extremely important to all life on Earth, but especially to human life. As before mentioned, Laurence Parker explained that there is a continuous decline in the population of honeybees that if continued will lead to the complete extinction of them sometime between 2040 and 2060. This should motivate people to join in conservation efforts because a third of our food comes from bees and there are many plants that will not be able to thrive without these pollinators. There are several problems that have contributed to this downward trend of honeybees, four of them are climate change, pollution, invasive species, and habitat loss and fragmentation. There are also numerous adaptations that people can apply to their lives in efforts to save the honeybees as well as many other endangered species. Some examples are pollinator-friendly gardens and agriculture, better land conservation, and a push for more land conservation legislation. If people do not start getting serious about the extinction of bees, they will have to make innumerable amounts of changes in their everyday lives and diets.

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