Introduction

In the past decades, the environment has been progressively deteriorating due to many factors. Climate change, plastic pollution, and carbon emissions are publicly addressed as the main drivers of environmental decay caused by humanity. The threat to insect pollinators and other similar issues have been much disregarded without taking into account the fact that they are of utmost importance concerning the well-being of the environment.

The threat to insect pollinators is one of the critical problems the environment is experiencing as the extinction of these species is severely affecting agriculture, human nourishment, and the integrity of ecosystems. The population collapse of insect pollinators can be attributed to parasites, habitat loss, pollution as well as many more. Scientists characterize this international crisis as "the sixth major extinction event," and such a decline is already heavily influencing crop production and the sustainability of different ecosystems. Insect pollinators are experiencing an annual decline of 2.5% over the past 30 years, an extremely rapid pace taking into consideration the period in which this has taken place.

This specific crisis is an aftereffect of the overuse of chemicals in different agricultural practices, invasive alien species, and climate change. All of these influences affect the population of insect pollinators differently as they aggravate distinct aspects of their natural environment. Agriculture’s heavy reliance on chemical with climate change have a drastic negative effect on insect pollinators. Alongside invasive alien species and habitat deterioration, these aspects are all provoking the threat of extinction of these species.

Fortunately, many executives have been taking severe measures to address it. NGOs, scientists, and governmental bodies are starting to take immediate action in collaboration with experts. Such acts may include the reform of a legal framework concerning agriculture and environmental protection. Although these efforts are meaningful and essential more significant nations and the international community, need awareness and involvement.
Definition of Key Terms

**Ecosystem**

The complex aspects of a physical environment, specific species, and their interconnected relations. ¹

**Insect**

Insects are considered to be any species that relate to the same class as bees and bugs, which are defined as arthropods. Their distinct physical structure consists of a clear head, only three pairs of legs, and typically one or two pairs of wings. ²

**Pollination**

It is the process of transporting pollen from one organism to another. It mostly refers to the natural processes necessary for the reproduction and other several operations of floral species.

**Pollinator**

It is an animal that moves pollen from one floral species to another, either directly or indirectly. ³

**Invasive alien species**

Invasive alien species are species that have been moved, due to several factors, to another ecosystem/habitat affecting the wildlife and the plant life.

**Pesticides**

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They are chemical compounds used in agriculture to exterminate fungi, rodents, insects, and specific plant species. Their use can be found in other sectors to annihilate diseases and infectious mosquitos.  

**Pathogens**

A pathogen can be often categorized as an infectious agent that can inflict disease or illness to the hosting organism.

**Herbicides**

As of its definition, it is an agent that is used to destroy infections plants and can be found most commonly used in agriculture.

**Insecticides**

It is a chemical agent that is intended to kill insects as well as specific pathogenic species such as mites.

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### Background Information

Pollination is highly essential for plant species as it transfers pollen from the male part of a plant to the female, allowing several necessary procedures to take place. Such methods include the reproduction of the plant species as well as the production of substances like oxygen and hydrogen. Besides, it can ensure biodiversity as cross-pollination between plant species can create new forms of plant breeds.

There are two primary forms of pollination them being abiotic and biotic. Abiotic pollination refers to indirect pollination without the involvement of any other kind of life. Abiotic pollination can be achieved as an example with wind or even water. Biotic pollination involves different animal species to intervene,

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causing cross-pollination between plants. There are a plethora of pollinators that contribute to the biotic method of pollination, which includes honeybees, hummingbirds, and butterflies. Their primary purpose is to transport the produced nectar and pollen from the male plant to the female counterpart. This occurs through different specialized courses of action that differ between animal species. Insect and animal pollination are the easiest to take place in comparison to abiotic and self-pollination as it is a quicker and more efficient procedure. Species pollinators usually transport the necessary substance for pollination between plants unintentionally due to the property of the element. For instance, pollen being a relatively adhesive substance sticks to the pollinator allowing its transportation to happen.

On a more general note, plant pollination is needed for the sustainability of diverse ecosystems and sufficient agricultural production. The process of pollination helps with the creation of fruits and seeds, thus, required for agrarian practices. As of which pollinators help 35% with global production, and different economic studies have found that they contribute to the worldwide economy with 150 billion euros annually. Such economic impact is roughly 9.5% of the total monetary value of food production worldwide. Yet the human impact is far more significant than the natural causes of insect pollinators decline. Degradation and destruction of habitats can affect many aspects of the well-being of these species.

Several factors are negatively impacting insect pollinators’ population. These factors vary greatly but contribute to the problem overall, which include climate change, habitat loss, poor land management, pesticides, environmental pollution, and invasive alien species.

**Climate Change**

Climate change is an environmental issue that has arisen in the past century as industrialization has been taking place. This is due to various sources such as global warming and greenhouse gasses. All of these have a different magnitude of impact on the ecosystems around the world. As of an immediate effect, insect pollinators are directly and indirectly affected by this alteration. One of the effects that climate change has is in the floral aging periods, which fluctuate on a substantial level. This issue is caused due to the fluctuations of temperatures that change the growing periods of botanical species as distinct conditions must be met to allow specific processes to take place. Insect pollinators, which much depend on the floral aging periods, are seeing consequences on the overall benefits of pollination as lower productions of pollen and nectar as well as delayed plant reproduction seasons. As temperatures rise, there is a higher chance of fires occurring, thus, creating a threat to the insect pollinator communities. Lastly, climate change can affect the livelihood of forests, which will damage pollinator colonies as well as the floral species themselves.
Agricultural Practices

Agricultural practices are a highly important factor regarding the threat to insect pollinators. The main problems caused by these types of methods are the chance of damaging the livelihood of pollinators, the elimination of sources that produce nectar and pollen, and the risk of eliminating insect nesting material. There are many ways that specific agricultural practices can be a threat to insect pollinators as different chemicals and methods are used.

Types of Practices and their effects

The practice that mostly affects the pollinators negatively is chemical spraying. The way that this happens is through the use of agricultural aircraft that are specially designed for this use. They utilize a trailing edge under their wings to be able to spray the appropriate chemicals in the farming fields. Their utilization can be mostly seen in extensive agrarian lands because of their size and ability to fertilize the area with my greater ease and effectiveness that hand-fertilization. The negative side of their use is mostly accidental. Namely, their spraying radius is large and can reach spaces outside of the field. Therefore, pollinator populations can be infected by those dangerous chemicals. With this in consideration, these species can also be found in the area of the fields, thus being immediately affected. Yet, spraying is not the only practice that has these adverse effects. The chemicals correctly used are available to the public and used in everyday spaces, for instance, gardens, households, and confined areas. Such uses influence the situation threatening the insect populations in those regions.

Types of Chemicals and their impact

On a general note, the chemicals used are dangerous and threatening to the targeted species and the beneficial insects such as pollinators. In the agricultural industry, the substances used are mostly pesticides like insecticides, fungicides, and herbicides. All of them have their special use as they target different types of threats.

Herbicides are a chemical substance that is purposed to exterminate plants. Before its creation, conventional farmers used to take out of their fields the unwanted or disturbing plants such as weeds. This manual work is done to prevent their crops from being either damaged or infected. Modern farmers use this specific chemical to lighten the excessive manual work required. Although this type of compound is useful, it can harm other types of plant life as well as the pollinators. Insecticides are a specific chemical substance frequently used in agriculture to protect the crops from intruding species. As for the property of this chemical, it coats the entirety of the plant and causes constant toxic exposure to non-target and targeted pollinators.
Environmental Pollution

Environmental pollution, although not one of the most significant causes of this issue is an important one due to its subtlety. Air pollution, in particular, can affect the coherent relationship between insect pollinators and flowers. Infection may alter the chemicals produced by plants during specific proceedings as well as damage the pollinators by harming their natural coordination, referring to the ability to navigate. Expressly, plants release different scent molecules. Air pollution breaks down the produced chemicals interfering with the forage of those species. Often those insects have their nesting areas distant from the floral areas, so air pollution can damage their ability to find and locate the plants.

Invasive alien species/ pathologies

Invasive alien species, as of their definition they are species who have changed their ecosystem due to a specific cause. This can happen mostly from humans as they relocate them to different areas for commercial purposes. This can alter the hosting ecosystem as well as the wildlife that is feeding off of. Although this can be extremely harmful to the ecosystem, there are other instances where invasive alien species are especially dangerous. Invasive pathologies are a variety of pathogens that have been exposed to insect pollinators through mostly the commercial use of bee species. It can decline the population of these species because of their harmful nature. Still, a delicate ecosystem can facilitate their reproduction, which can harm insect pollinators as well as plant life.

Major Countries and Organizations Involved

Country or Organization

United States of America (USA)

The United States of America has several programs that facilitate the preservation of insect pollinators, their colonies, and their habitats. As of their department agriculture, it has improved their research conducted to specific pollinator species such as honeybees. After 2016 their data findings have been more detailed as they have broadened their sample size from previous years. Although an increase in research can be seen, there have been minimal efforts to act accordingly. Environmental conservation on a general note is not one of the primary issues discussed in the annual US agenda but is instead left for the United States of America Department of Agriculture. It is underfunded, thus, not having the financial capabilities to further expanded their research and the necessary conservation methods.

People’s Republic of China
In China, there is a considerable pollinator habitat deterioration as well as a decrease in their population. It is mainly caused by pathogens and mites that are of unknown origin. China, in particular, has shifted its economic dependency from agriculture to industrial, domestic demand and exports. This has as an effect the focus on those matters of economic growth with a disregard of the environment. So, farmers are taking their actions to prevent reduced production. They have changed to manual labor, which has slightly improved the massive loss of pollination.

Egypt

Egypt is much suffering from the threat to insect pollinators. As a nation that is relatively based on agriculture for economic development, it is severely affected by this issue. Most of the countries agricultural production comes from the Neil river as it is the largest water source in the region. Neil is used by a plethora of nations in the region, which in this specific case, has a negative effect. It is more likely for insect pollinators to be infected by a disease. This is the main problem that pollinators face, which affects the agricultural production of Egypt. There is no clear and distinct action to reverse this problem.

Germany

Germany is one of the many European nations that have been severely impacted in terms of the insect pollinators population. In light of this effect, Germany has taken a great initiative to address this issue. As a nation, it has increased the governmental funding necessary for awareness campaigns as well as programs to preserve pollinators. The private sector is also taking the appropriate action in collaboration with national bodies. Awareness and preservation campaigns have been taking place, making Germany one of the nations with a high focus on environmental integrity. Though many of their attacks are centered toward a specific pollinator species, they often fail to address other wildlife. Lastly, there is no monitorization of these programs; therefore, not being able to prove that such actions are helping the matter.

United Nations Environmental Program (UNEP)

UNEP is a non-governmental organization that heavily focuses on addressing all of the environmental problems. They have focused on mostly researching the matter at hand but have acknowledged that those research reports can be inconsistent for several factors. As of this, they have created campaigns to raise awareness and push governments to take action. On this specific matter, no significant recorded action has been considered as of yet, but several agendas with proposals have been created.
### Timeline of Events

<table>
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<tr>
<th>Date</th>
<th>Description of event</th>
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<tbody>
<tr>
<td>October 1998</td>
<td>Sao Paolo Declaration on Pollinators, which was submitted by the Brazilian government.</td>
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<tr>
<td>May 2000</td>
<td>The Conference of Parties (COD) adopted the International Pollinator Initiative</td>
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<td>April 2002</td>
<td>The COD decided to review the adopted initiative periodically</td>
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<td>2008, 2012 and 2014</td>
<td>Periodic annual reports were provided to the COD</td>
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<tr>
<td>2014</td>
<td>United Kingdom’s National Strategy for Pollinators was adopted</td>
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<tr>
<td>December 6th, 2016</td>
<td>13th meeting of the Convention on Biological diversity took place, which urged countries to prioritize the protection of insect pollinators.7</td>
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### Relevant UN Treaties and Events

The United Nations have been quite lackluster in the number of initiatives that have been taken in order to protest insect pollinators from their extinction. As of the events that have taken place, UN non-governmental organizations have been utilizing awareness campaigns and research reports to inform the public on the issue at hand. On a more general note, there have not been many attempts but rather proposals, which at times can be ineffective.

- The International Pollinator Initiative, Plan of Action 2000-2015: This is a phrase adopted by the United Nations to monitor the decline of insect pollinators, the causes, and their impact as well as the economic aspect such as the economic impact and their value. Also, the initiative was created

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2to provide the necessary tools for NGOs and governments working towards taking action to ensure that they are appropriately informed.

- The International Pollinator Initiative, Plan of Action 2018-2030: As of its predecessor, it is a plan promoted and created by the United Nations during the 13th Convention on Biological Diversity. Its differentiation from the previous initiative is that there is a great emphasis on future scientific research and the previously gathered data to construct correct solutions.

Previous Attempts to solve the Issue

Taking into consideration the attempts that have been taken by the United Nations to resolve the issue, it is evident that this would equivalent to the previous efforts made by nations and NGOs. Instead, non-governmental organizations and commissions have taken affirmative action to solve the issue.

The European Union, after the proposal made by the European Commission it has banned the use of three main chemicals, which were of commercial and everyday use. The ban is specific to outdoor spaces as they have been proven harmful by several scientific studies. The EU will adopt a way of measuring the respective data for pollinators, such as their annual decline, population, and status. In addition to this measure, the Horizon 2020 economic program will provide promote through funding research on this issue. Last but not least, raising awareness and public engagement is what this proposal is striving for to increase funding and public education through school programs and projects.8

The United Kingdom has adopted the National Pollinator Strategy that sets out ten strategic goals to change the ongoing decline of the pollinator population. It is intended to propose land management reforms, improving agricultural practices, and raising awareness. It has a time plan of 10 years to be significantly implemented. To conclude, it is being promoted and collaborated with several sectors like the National Trust and the Ministry of Defence.

Possible Solutions

As the issue has been addressed reasonably recently, there have been no real failed attempts to solve the issue; thus, a better enhancement can be taken to better facilitate those actions. Nevertheless, the problem needs immediate measures to prevent its aggravation.

First of all, nations can take the first initiative to include this matter on their agenda to address it as soon as possible. Though many nations have different environmental policies still the threat to insect pollinators and its global influence is excellent; thus, immediate change in policy is necessary. Countries have to adopt a stricter stance on how certain hazardous chemicals are used in agriculture and everyday life.

Secondly, a change in the regulatory system of the nation is of imperative importance. Stricter agricultural monitoring can be helpful as governments can have a better understanding of what agrarian practices are used, the extent of their use, and the impact that they have on insect pollinators by promoting better and more efficient agricultural practices. Negative influence that these practices have on insect pollinators can be reduced.

A stricter regulatory system must take place that will entail all of the causes of this problem that can be addressed by a government. The chemicals used in agriculture and commercial users should be adequately treated as well as promoting research to develop more and less harmful substances.

Funding and further development of research methods and NGOs that are working towards solving the matter are also vital. A correct way of processing and analyzing the retrieved data will help with how the problem is addressed holistically while identifying specific aggravating causes and the possible ways of resolving them.

Lastly, awareness campaigns and programs to engage and educate the public, as well as providing easily accessible solutions, will help as not only one force such as a government or an NGO will be actively operating toward minimizing the threat insect pollinators are facing.

As the solutions, as mentioned above, can be an essential base towards achieving creating feasible solutions to achieve healthy insect pollinator populations a further elaboration and specification are deemed necessary.

Bibliography

“Advantages & Disadvantages of Pollination.” Hunker,


Greentumble. “Why Is Pollination Important to Agriculture?” Greentumble, 4 Sept. 2019,
https://greentumble.com/why-is-pollination-important-to-agriculture/.

“Invasive Alien Species.” Invasive Alien Species - Environment - European Commission,


“Methods of Pollination.” Science Learning Hub,


Soffar, Heba. “The Types and Methods of Pollination in the Plants.” Science Online, 12 Nov. 2019,

“U.S. Forest Service.” Forest Service Shield,

Vanbergen, Adam J. “Threats to an Ecosystem Service: Pressures on Pollinators.” The Ecological Society of America, John Wiley & Sons, Ltd, 1 June 2013,
Appendix or Appendices


The economic aspect to this issue as important to the environmental one. As for many nations, agriculture is the main source of economic growth and development. The above link provides not only information about agriculture but on pollinators and the threat they are undergoing.


Data on the threat to insect pollinators is necessary in order to create effective solutions thus, data can be collected from various regions around the world providing an image of the issue from an international level. Germany and Puerto Rico are a few places that are mentioned in the link above as well as a clear understanding of the problem at hand.
III. “U.S. Forest Service.” *Forest Service Shield*,

The United States of America are one of the many nations that are greatly affected by the threat to insect pollinators. The research that has taken place by the U.S. Forest Service is one that has created a holistic understanding of the matter as well as the cultural and environmental significance of insect pollinators.


The European Union has taken great initiative in order to tackle one of the threats to the insect pollinator population. By explicitly providing the actions such as a new regulatory system the issue can be better managed. Similar actions can be taken in order to improve the aggravating situation.