Introduction
Pesticides, along with many other factors, have a devastating effect on bees and many other wild pollinators. Pesticides are typically found on lawns, farms, and garden products. They are very hazardous to bees, either killing them, or reducing their ability to fly and continue to pollinate. One third of pollination performed in the world is completed by honeybees. Many fruits and vegetables depend on pollinators for reproduction. Additionally, we as humans depend on the pollinators for our own food supply.

How to Protect the Bees Against Pesticides
Its best to avoid applying any pesticides at all if possible, as there are many pesticides that can be harmful to bees/insects and even humans. Some harmful pesticides include insecticides and fungicides, which are often applied to ornamental plants that attract bees, like lavender and rose. The problem with this is, bees and other insects could possibly be harmed if they consume nectar or pollen containing the pesticide. If you insist on applying pesticides, it is least harmful after flower petals have fallen, when plants are less attractive to bees. This will reduce the risk of bees coming in contact with pesticides. If you must spray ornamental plants that are in bloom, Washington State Department of Agriculture recommends you choose a pesticide that is less toxic to bees. Read the label to see if the pesticide contain a neonicotinoid insecticide with these ingredients, Clothianidin and Thiamethoxam. Insecticides containing these ingredients should only be used after flower petals have fallen, because they may be very toxic to bees for several days after application. When buying ornamental plants that are known to attract bees, try to buy plants not treated with insecticides.

Environmental Causes for Concern
Large numbers of bees are found dead in front of hives. The cause of their death is none other than harmful pesticides. Pesticides are the only toxic substances released into our environment with the purpose of killing living creatures. Pesticides such as Orthene 75S, Lorsban 4E, and Chlorpyrifos are some of many pesticides that are extremely harmful to bees and other pollinators.

The issue with these types pesticides is that they have great amounts of toxicity, which gets into the bees systems, killing them and other pollinators. The reason people continue to use pesticides is because farmers who want harmful weeds or insects off of their plants, achieve just that with their pesticides, so why would they want to stop?

With bees being the main pollinator in the world, if they were to become extinct, a huge decrease in our food will occur, leading to severe problems for us and our food supply.

Since pesticides are used nearly everywhere, it is difficult to get people to stop using them. Pesticides are used in homes, parks, schools, and other buildings. This would obviously make it more difficult to get people to change their ways. Like many other environmental problems facing Earth, the growing number of pollinator deaths is due to our own current behaviors and practices.

How to Solve the Crisis
There are actually many ways to help protect and prevent our bees from disappearing. However, this is not something that will happen overnight. It is going to take a lot of time and sacrifices within our society to change current pesticide practices. One thing that is very important is to get this information out to the public. This information is something that needs to be spread to more than just to a few communities; the greatest impact will occur when this information is spread nationwide. The media is a great means to educate the public regarding the dangers facing our pollinators. Honey Nut Cheerios is removing the bee from the box to raise awareness that our bees are dying.

Unfortunately some people that learn about the problem facing bees lack concern for them; they are more concerned about their own crops and the money earned from farming. An effective solution to the declining bee populations would involve banning some of these very harmful pesticides and fining those individuals still using them. Bees play a big part in our society as 70 percent of the crops that we eat are pollinated by bees (National Geographic). 35 percent of a person's daily diet depends on the pollination of bees (National Geographic). Without bees, the human population could face extinction, as crops that are pollinated are our major food source.

While there are many causes for the decline in bees but it has been proven that pesticides are the number factor in the decline. People need to understand that every little thing help and spreading around this info and doing anything possible to help can start a chain reaction and in a few years we can make a dramatic impact of the decline of bees!

Honeybee Colony Collapse Disorder (CCD)

Colony Collapse Disorder (CCD) is the loss of a massive amount of bees that has currently been recognized as an urgent crisis. What it is, is the majority of the bees in a colony disappear and leave behind a queen bee, plenty of honey reserves, and a few nurse bees to care for the rest of the immature bees. CCD was first reported in 2006 when numerous beekeepers were frantic when all their adult honey bees were disappearing.

Scientist believe the cause of the bees leaving is because of a mite that is a pest of the honey bees, they are a parasite that the bees can not defend themselves against. Another hypothesized cause under investigation is the lack of nutrition and plants in their environment; they are leaving to find plants that are healthy and nutritious.

Conclusion
In conclusion, pesticides and many other factors have devastating effects on bees and many other pollinators. It is best to avoid applying pesticides at all. If possible, there are many other alternatives for protecting your crops or other plants. Many pesticides are also harmful to humans so you are not only hurting and killing bees, you are harming yourself and others! There are many solutions for treating your crops or ornamental plants so instead of using all of those harmful chemicals that you and other wildlife will be consuming, look up human and bee safe ways to protect your crops or other plants.

References
References for literature cited and photograph sources are provided in an additional hand-out.
Environmental Cause for Concern
There is concern that the Asian Carp will invade the Great Lakes and cause marine destruction. Because of their large body mass, they have been known to hurt boating fishermen by jumping out of the water and accidentally injuring people when they are startled. They like to uproot aquatic plants that other freshwater organisms use to survive and causes the water to be muddy, preventing other plant life from getting sunlight. They've been known to transmit parasites and bacteria from foreign environments. They increase the likelihood of algal blooms, which in mass amounts prevent sunlight from traveling through the water to aquatic plants. They cause native fish species population to decline. “Once loose, Asian Carp spread quickly, reproduce rapidly, and become very abundant.”

Invasive species: plants, animals, or pathogens that are non-native or alien to the ecosystem under consideration and whose introduction causes or is likely to cause harm
Asian Carp are an invasive species of fish that causes harm to freshwater aquatic environments by uprooting aquatic plants, causing poor water quality and preventing other organisms to be deprived of sunlight.
This invasive species was brought into the United States for different reasons. However, it was still an accident for the Asian Carp to spread this far.
They were originally used to control nuisances in aquaculture facilities, farm ponds, and sewage lagoons.
Flood events caused Carp to escape from their original placement and to spread quickly.

Proposed Solution
Raising money to fund organizations that are capable of possibly preventing Asian Carp from invading the Great Lakes in humane ways like putting gates in waterways that they cannot get passed. Many organizations are working to find ways to keep this invasive species out of waterways that have not been invaded. There have been Acts passed to have fisherman purposely overfish to try to rid the waterways of Asian Carp. Congress passed the Water Resources & Reinvestment Development Act (WRRDA). It states that the Upper St. Anthony Falls Lock was closed, providing a “virtual fail safe protection” from Asian Carp entering the Mississippi River watershed north of Minneapolis. It also required that the federal efforts to protect the Great Lakes from Asian Carp encompass a more extensive area, including the Mississippi and Ohio River Watersheds.

Projection for Sustainable Future
Keeping Asian Carp out of the Great Lakes will keep the marine environment healthy and free of threats. If the invasion of Asian Carp into the Great Lakes is prevented, it will insure that the welfare of the marine environments remains in good condition. Therefore, it is very important that Asian Carp are controlled and do not get into the region of the Great Lakes.

References
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- https://stopcarp.org/the-solutions/

Acknowledgements
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How Different Types of Pollution Affect Marine Life
By: Evelynn Bengel, Andrew Crilley, Connor Ostermann
Fort LeBoeuf High School

Microplastics
Recently it has been found that microplastics are having a drastic effect on marine life everywhere. Microplastics are particles less than 5 millimeters in size, and they come from a multitude of products made from plastic today. The issue was discovered when microbeads (plastics) began to be used in personal care products all around the world. Microplastics have begun to affect all levels of the marine food chain. The main problem with microplastics is that they are so small they easily pass through water filtration systems, and are continuously getting put into our oceans. A way to prevent this problem is needed before it gets too out of hand.

Causes
1. Microbeads have been used in personal care products. Microbeads are microplastics, and ultimately enter water systems from our own homes. The microbeads are so small that they can not be filtered through the water filtration systems, and they all eventually lead to the ocean.
2. The natural environment also creates microplastics. When plastic enters into our oceans, it is broken up by the waves and rocks, until large pieces of plastic become microplastics.

Effects
1. When an animal consumes these plastics the body attempts to break down the plastics, releasing harmful chemicals into the body of the organism. Chemicals such as hydrocarbons, flame retardants, DDT, and BPA are very harmful to most marine life. These chemicals can and will cause death, behavior changes, problems of marine life maturing, and more.
   a. The behavior changes include, marine life being reliant on eating microplastics over their normal food.
   b. Microplastic chemicals can prevent fish eggs from hatching, and those that do hatch stop growing.
   c. The chemicals affect the digestive system by causing inflammation of the tissue.
2. Some of the particles are not able to be dissolved in the animal’s body, and they build up creating a blockade in the digestive tract of the smaller marine life, particularly the filter feeders and plankton.
3. Microplastics affect the animals lower in the food chain. This is causing a ripple effect on the marine food chains. The animals within lower food chains are dying causing food loss for the animals higher up, and so on.
   a. Eventually affecting the humans that eat fish.
4. Fish are not the only animals being affected. The birds that eat fish are also being affected. When fish eat the smaller organisms that have consumed the microplastics, the chemicals are now in the fish’s body. Then the birds eat the fish, and the chemicals enter the bird’s body causing effects similar to what fish face.

Solutions
1. In December of 2016 President Obama passed a bill banning the use of microbeads in all personal care products. The bill proposes a plan to remove 70,000 metric tons of plastic from the ocean over the next 10 years.
2. A new membrane technology, called VeSave, is being tested in removing microplastics from the water. It is being put in water filtration systems.

Oil
While it may be rare, when an oil spill happens, it’s a big deal. It breaks the biggest headlines for weeks and is the main concern for many environmentalists. The worst one ever, the leaking of the Deepwater Horizon oil rig, put 3.19 million gallons of oil into the Gulf of Mexico. It brought an incredible amount of people together all with one goal, removing the oil. Even with hundreds of thousands of people coming together to fix this catastrophe, it still killed a massive amount of marine life and birds. Oil has many harmful effects on wildlife, and if the spill is big enough it can’t be stopped in time to save these animals. The best way to stop oil spills is to prevent them from ever happening in the first place.

Causes
1. Leaky Pipes - This one can be the most dangerous because it can take months to detect. This happens when an oil pipe that is running through water breaks, and starts rapidly putting oil into the water.
2. Oil Tanker Ship Wrecks - This happens when a major Oil Tanker sinks/wrecks and all of the oil that it was carrying is dispersed into that body of water. The oil from the ship instantly releases huge amounts of oil, but it is easily detectable so responsive teams can get there as soon as possible. Luckily, this rarely ever happens.
3. Oil Rigs - This happens when an oil rig, out in a body of water, has some sort of malfunction, and either explodes itself or pipes break underneath it. This one again, is quite obvious when it occurs and is very rare. This is what happened with the Deepwater Horizon.

Effects
1. Gills - When oil gets in gills, it can produce clogs which can cause the animal to suffocate. Also the chemicals inhaled when oil gets into the gills can also cause death.
2. Drinking - If a fish consumes it, it will be very toxic to their body and it will most likely be fatal.
3. Eggs - When oil comes into contact with fish eggs it deteriorates the membrane and kills it. This halts fish reproduction for miles, for months, and is very detrimental of an oil spill.
4. Birds - When birds, like seagulls, who use the sea frequently come into contact with the oil, it coats their feathers and ruins their ability to fly. It can also affect their internal organs the same way it affects fish when consumed.

Solutions
There is no definite way to prevent oil spills, or save the animals we do in any better way, but we can try to be more cautious of these events happening. We can do things like, putting sensors that detect pipe leaks earlier and especially the most important thing is more volunteers. When the next oil spill happens, remember that YES are the most important solution. The more people that go to help remove the oil and help the animals the better.

General Pollution
Water is the world’s most treasured and needed resource of all, it fills our oceans and is home to millions of marine life. So, then why do we decide to throw our trash in it? Annually, over 300 million tons of garbage is thrown into the oceans globally. Since most of the materials are not biodegradable, they will continuously float around in the water, contaminating it and being harmful to all marine life. Most if not all of the current garbage in the oceans are caught up in current vortices, creating vast areas of circular waste that is incredibly dangerous. The prominent problem of Marine Pollution is how to prevent the waste from entering the water, and how to keep marine life safe from it.

Causes
1. Dumping - This is the deliberate throwing of waste into the ocean, where large boats carry the waste deep into the sea and dump it wherever they see fit.
2. Toxic Chemicals - Consists of dangerous materials from farmland pesticides, discharge from industrial sites and cities, along with sewage from large cities. Manmade waste sources from weather run-off.
3. Point Source Pollution - This is large-scale events, such as oil spills and chemical spills, which leave a major negative impact on the environment. Thankfully they occur less often which is helpful to all forms of Marine life.
4. Nonpoint Source Pollution - Smaller sources of pollution such as septic tanks, vehicles, and some larger areas like livestock ranches, farms, and timber harvest areas. Leaves a lasting effect for it is many small amounts of pollution that quickly gathers together to make a more hazardous environment. Also reaches the water by runoff.
5. Marine Debris - Includes general trash such as plastic and metal cans that is thrown into the water, along with loose fishing nets and abandoned vessels.

Effects
1. Endangered Marine Life - All forms of physical pollution poses a threat to the Marine life, for they make it hard to find food, become ensured in it, or it simply kills them. A recent statistic showed that over 2 million seabirds and 100,000 sea mammals are killed each year by Marine Pollution.
2. Contaminated Water - From all these chemicals, toxic, and basic materials that make the water quality unhealthy for life.
3. Algaid Blooms - The overgrowth of algae caused by the increasing nitrogen and phosphorus level creates harmful alga blooms that can overwhelm a water area and potentially kill life from within, which can be classified as dead zones.
4. Contaminated Seaweed - Not only are the marine life in harms way, but people are too when they ingest contaminated seaweed. Fish or other life that has eaten pollution or breathed in harmful chemicals are already infected and no longer edible. But when that is not known and the fish it caught is being prepared to eat, it puts people at a very high risk of food poisoning.
5. Altered Navigation Safety - When excess amounts of waste is poured into the ocean, it can become difficult for ships and Marine life alike to travel places with such a barrier to cross. Some large garbage barge stretch for many miles wide.

Solutions
1. Reduce, Reuse, Recycle! This is the main method of salvation for the oceans of the world and the Marine life that dwells within.
2. In 2013, the EPA pledged to cut down on plastic pollution in the oceans, monitor areas common for being polluted, and conduct scientific reviews identifying the effects of ingesting seaweed that had been contaminated.
3. In 2014, the state of California put a ban on the distribution of plastic bags by retailers, which has greatly decreased plastic pollution.

Facts & Statistics

Microplastics
- Microplastics are particles less than 5 millimeters in size.
- 93.2 thousand tons of tiny plastics are predicted to be in the oceans.
- A study in 2015 found that 8 trillion microbeads are putting into our oceans and is home to millions of marine life. So, then why do we decide to throw our trash in it? Annually, over 300 million tons of garbage is thrown into the oceans globally. Since most of the materials are not biodegradable, they will continuously float around in the water, contaminating it and being harmful to all marine life. Most if not all of the current garbage in the oceans are caught up in current vortices, creating vast areas of circular waste that is incredibly dangerous. The prominent problem of Marine Pollution is how to prevent the waste from entering the water, and how to keep marine life safe from it.

General Pollution
- In 1991, Iraq purposely put 300 million gallons of oil into the Persian Gulf, as part of the Gulf War
- The company that owned the Deepwater Horizon had way too much oil. So, then why do we decide to throw our trash in it? Annually, over 300 million tons of garbage is thrown into the oceans globally. Since most of the materials are not biodegradable, they will continuously float around in the water, contaminating it and being harmful to all marine life. Most if not all of the current garbage in the oceans are caught up in current vortices, creating vast areas of circular waste that is incredibly dangerous. The prominent problem of Marine Pollution is how to prevent the waste from entering the water, and how to keep marine life safe from it.

References
All the cited information, images, etc. have been documented on a separate handout.
Microplastics: Effects on Aquatic Life
By: Dakota Bell, Mickayla Billey, Jasmine Brooks
Fort LeBoeuf High School

Abstract

Microplastics in the ocean have been a growing concern for many years, and is an ongoing problem. Microplastics are less than 5 millimeters small, making them incredibly hard to see. By getting into the ocean, these plastics are causing many complications. Organisms in the ocean, mainly fish, are starting to mistake microplastics for food. Microplastics are affecting the oceans greatly, and need to be eliminated. There are many ways by which people can prevent microplastics from ending up in the ocean.

Background Information

Microplastics can be defined as a plastic particle of less than 5 millimeters in size. The occurrence of microplastics on the beach was not reported until the 1970’s. The term ‘microplastics’ was not used until recently. 300 million tons of microplastics produced globally each year. Microplastics have greatly increased from 2004 to 2014. It is well documented that plastic litter is very harmful to living organisms. Microplastics are responsible for killing fish and/or preventing them from reaching maturity. This is stopping fish from reproducing and greatly impacting fish populations. The United Nations Environment Program, UNEP, reported several highly concerning recent findings, including a study in 2016 that found that a quarter of the seafood sold in markets in California contained plastic. Microplastics can occur from many things. It can occur from plastic bags and bottles, and any other plastics waste that gets into the ocean. Also it can occur from types of washes that use beading of any kinds. These products are too small to be caught in water treatment plants so therefore travel down the drain and into the ocean. Microplastics have greatly increased from 2004 to 2014.

Environmental Cause for Concern

Microplastics have become a great danger to aquatic life very recently. One of the main contributors of microplastics to our aquatic systems are personal care products, which allow microplastics to wash down our drains. Microplastics do not biodegrade and are very small for animals to ingest. This is how many organisms end up with them in their body. A study in 2015 showed that more than 8 trillion microbeads have entered fresh water systems.

One study found that in oysters, the absorption of microplastics has caused them to eat more algae, which has improved in reproduction for this species. Although this study has shown growth in reproduction it also has shown complications in oysters and other marine life. Chemical toxins such as DDT and BPA have been found to adhere to microplastics. These chemicals can disrupt the food chain when ingested by marine life. Another study was conducted about how now microplastics are killing off fish before they can reach the reproductive phase in life. Many young fish have been shown to prefer eating these tiny microplastics compared to their natural food source. This act has caused the young fish to starve to death before reaching a mature age. As animals swallow these tiny killers, they cannot digest them. Which leads to a buildup in their digestive track. Scientists have also observed that these microplastics have inhibited organism’s behavior, these changes are their responses to danger. However, these mechanisms are fully not understood quite yet.

Proposed Solution

There are various ways as to how the growing threat of microplastics in the ocean can be resolved. For example, laws can be passed, corporations can fix the way they produce and make products, campaigns can be started, and many more. Many people have come up with solutions as how to approach getting rid of microplastics within the ocean. In the year of 2015 President Barack Obama signed a bipartisan bill for the ban of all microbeads within the United States. This bill prohibits the selling and the distribution of products containing microbeads. Companies such as Unilever, Colgate Palmolive and L’Oreal have eliminated microbead production. Other acts of retaliation against the use of microplastics is the #foamfree Action Campaign. The point of this campaign is to ban polystyrene, also known as Styrofoam. The Environmental Protection Agency states that Americans use about 25 billion styrofoam cups each year. These products are typically never recycled, and end up in landfills and waterways. The styrofoam cups then turn into polystyrene and become very small microplastics. As a result many animals become endamaged by the styrofoam and mistake it for food. The microplastic then blocks the animal’s digestion, causing starvation and death. However, banning styrofoam can end this. Anyone can join the #foamfree campaign by starting your own local ban polystyrene. By stepping up and encouraging others in your town to go foam free, the amount of microplastics that are in the ocean will be greatly reduced. The state of Illinois has been the very first state to jump on board by banning the production of microplastics. By 2018 Illinois is hoping the ban will be in full affect. Following behind, Ohio, New York, and California are also looking into the ban. Other ways to reduce the production of microplastics within our ocean is to talk to developing countries. In rapidly developing countries, there are a high demands for plastic. This is due to plastic being very cheap, while still being durable. All of this plastic being produced eventually turns into microplastics if not taken care of properly and ends up in the ocean. However, by helping these developing countries, the amount of microplastics will be greatly reduced. For example, the Ocean Conservancy is focusing on creating waste infrastructures that are highly sophisticated for the developing countries. By producing well made waste infrastructures, waste will be taken care of appropriately.

Projection for Sustainable Future

The proposed solutions listed will affect the sustainability of the future greatly. By enforcing laws against the production and use of microplastics and microbeading, no new microplastics will be being produced. Although there are trillions of microplastics already in the sea, stopping the production of them now will keep them from adding up. These laws will also stop companies from also using microplastics within their products, thus lowering the amount of microplastics in the ocean over time. Helping developing countries create sophisticated waste plants will also drastically lower the amount of microplastics being put into the ocean. By creating waste plants the plastics will be taken care of properly. Putting garbage the correct areas will decrease the ability for the plastic to end up in the ocean and will stop the potential break down of the waste and cease the growth of microplastics.

What you can do?

Tips and tricks!

• Don’t use products with microplastics and microbeading.
• Recycle your trash or responsibly throw it away.
• If you see trash on the ground pick it up.

References

References may be found within the provided brochure.