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COS 300

Mini Literature Review

A main focus in our society today is to better our planet and the environment we live in. Making it a rich and prosperous environment for everyone. The UN Sustainable Development 2030 goals (SDGs) are a step in making this possible. The 14th SDG listed revolves around Life Below Water. The focus of this SDG is conserving oceans and creating sustainable development plans. A major issue outlined in the Life Below Water SDG is plastic pollution. Our oceans and other bodies of water are a vital part of our ecosystem. Unfortunately, they are being damaged by the improper disposal of plastics by companies and individuals. This literature review aims to detail some of the information that is available on this topic, as well as review the strengths and weaknesses of the literature provided.

In order to understand plastic pollution, we must look at the effects it is having on our environment. In the first article reviewed, *The Effects of Plastic Pollution on Aquatic Wildlife: Current Situations and Future Solutions,* Michelle Sigler gives an overview of the effects and potential damage that can be caused by plastic pollution. The article begins with a short introduction that provides information on the production of plastic and the amount being produced. As well as a brief introduction on effects of the plastic ending up in various bodies of water and ways to decrease these effects.

The article goes on to explain the effects these plastics have on our environment and wildlife. Garbage patches, giant clumps of plastic debris that are caused by colliding currents trapping the debris in a circular pattern, are becoming more common. The amount of pollution collecting in the oceans is becoming extremely dangerous to the environment and the wildlife that inhabit that area. The plastic is being mistaken as food and consumed by the animals, while bigger pieces are trapping animals causing serious injuries. The issue of wildlife being seriously injured by the ingestion of plastic is emphasized by numerous accounts of birds, fish, turtles, and cetaceans that have been injured and affected by this. The lack of information on the effects of plastic pollution in freshwater ecosystems was also a very important point that was mentioned.

Next, ways of managing the effects of plastic are listed. Tracking garbage, introducing new ways to recycle plastics, and gathering these materials from the oceans are just a few ways we can help reduce the harmful effects of plastic pollution. Tracking is a great way to help keep track of where the plastic waste is going. According to the article by doing this we get a better understanding of where our plastics are ending up, and this information can help influence others to consider the serious impacts of this pollution. New technologies such as using the oceans currents to collect plastic debris and ocean drones to skim deeper into the oceans to collect the debris there are some ways, we can reduce the plastic already in the ocean. New ways to recycle such as thermal degradation could be a better and more effective way to recycle than traditional recycling, where only about 10% of items are actually being recycled.

The conclusion to the article reiterates the harmful effects plastic pollution is causing and the different species that are being affected. It also brings up the issue of the how smaller bodies of water are being affected and how new technologies being developed can be used in these areas as well. It also puts emphasis on the need for new developments in recycling. It looks at the bigger picture and points out that even with new technologies and better ways to recycle, plastic debris will not disappear until plastic pollution is reduced.

This article was very informative on the different effects of plastic pollution. The article did a good job at answering the research question presented in the article, “How has plastic pollution effected aquatic wildlife?”. Not only did it explain how plastic pollution is affecting wildlife environments, it provided possible solutions to help reduce the harmful effects plastic pollution is having. It was very well organized and provided lots of useful information that was well organized and easy to read.

The strengths of the article were the amount of information provided and the resources mentioned that reinforced the research question at hand. This article included tons of helpful information that was backed by other resources and statistical data. The numerous resources provided the article with a strong backbone to support their claims. The statistical data also allowed the information to provide a clear picture of how big the problem is.

The article however did have a few weaknesses. One of these would be a lack of graphs. The article was full of various statistical data that provided a clear picture of the problem at hand, but there were not any graphs or figures to help visualize the data provided. By adding some graphs or figures the data given could have been more thought provoking and impactful. Another weakness of the article was the use of some possibly outdated resources. A lot of resources were listed and most of them were more recent but there were a couple that were very old. It would have been better if a more recent article source about the same subject had been used.

The overall design of the article was very organized and clear to understand. The article was grouped in different sections and made the information more concise and easier to understand since it was not spread out randomly. It was written in a way that allowed the reader to understand, no matter their amount of background knowledge, and used terms that were easy to define or defined any terminology that may not be as well known to the reader. I feel that there are still opportunities for research to be done on this topic. More investigation can be done on the freshwater environments that are being affected by plastic pollution. If more research and information is available, then more investigation can go into technologies that are being developed to help with the reduction and cleanup of plastic pollution. Overall this article did a good job at providing useful information on a serious topic affecting our environment.

To comprehend the full extent of the negative effects of plastic pollution we must look at all possible areas that it may effect. The effects on wildlife and habitats are widely known, but the negative effects on economic, social, and human wellbeing are less talked about. In the article, *Global ecological, social, and economic impacts of marine plastic*, the writers explain the different impacts that marine plastic pollution is having on the environment around us. Marine ecosystems provide services that range from food to waste detoxification to recreational activities, but any damage to these ecosystems can negatively affect the resources that are being provided by these ecosystems. For the full effects of marine plastic pollution to be understood individuals need to have an understanding on the other impacts of this pollution; ecological, social, and economic.

The article used different resources to create a table that shows the multiple outcomes of marine pollution on 12 different subjects. The purpose of the graphs was to show the variety of effects the pollution is having on various areas, but to also show the greater amount of data that has been collected on wildlife, such as birds and fish. The data that was compiled also showed that there was a medium to high frequency impact and a medium to high frequency of irreversibility. The data looked at showed a negative impact except for two subjects. The results of the ecological impact results were combined with other sources. and showed that mostly all ecosystem services were affected by marine pollution, with only one exception.

Marine pollution and its effects on the wellbeing of humans is the next major point of the article. The article takes focus on three critical services that were marked with a high negative impact and discussed the direct and indirect consequences it has on human wellbeing. Firstly, they look at fisheries. Marine pollution can entangle and cause damage to fish which in turn can cause a depletion in the amount of fish that can be caught and used in commercial fishing. Fish can also consume microplastics and could potentially cause harm to humans when consuming them.

The other two areas that were focused on in the study were heritage and recreation. Some wildlife has a cultural significance to some groups of people. Injuries to these animals caused by marine pollution could result in the loss of them, which in turn could cause a negative impact on human wellbeing. Marine pollution can also influence areas used for recreation. Litter in these areas can cause a negative impact on tourism, resulting in a loss of revenue. There is also potential harm to individuals who work there, such as exposing them to toxic materials or resulting in some injuries due to certain types of debris.

The article then looks at the economic cost of marine plastic. Current research does not allow for an accurate cost prediction due to marine pollution, but the evidence in the article does provide view of the negative impacts on ecosystem services and a potential loss in revenue. The discussion at the end of the article emphasizes the negative impacts of marine pollution in ecosystem services and human wellbeing. The article also calls for a global research agenda to help with the reporting and recording of marine plastics and their effects on the environment around them.

The article was very informative and provided the reader with a different look at the effects of marine pollution. It did a good job at answering the research question and providing a solid background of information to help support its claim. It provided a different look at marine pollution and issues that are arising because of the effects it is having on the environment around us. Overall, the article was very informative and insightful.

Some strengths of the article were the use of graphs and tables. It made the information given more understandable and gave a clearer view of the different impacts the authors were trying to emphasize. Another strength of the article was the different viewpoint it took on. Most articles on marine pollution do revolve around its effects on wildlife, but by emphasizing the effect marine pollution has on services and human wellbeing it gives another reason for the problem to be more recognized. The article also used a lot of references but more importantly it used more recent references which makes it more up to date than some articles that revolve around marine pollution and its effects.

A weakness of the article was that at times it was a little bit wordy or hard to read. Some parts had to be reread over and over to fully understand what it was trying to convey. Another weakness of the article was the format of some of the graphs. Although they did make the information given easier to understand, a couple of the graphs were hard to understand at first.

It was well organized into sections that made the information flow nicely and build on top of the information preceding it. I also feel that there is more room for research on this topic and the article also emphasized the need for more research. More study in this area would provide more information and data on the topic. By researching the effects of marine pollution on services and wellbeing more data can be provided and a clear understanding of how it is affecting us can be developed.

An important aspect of plastic pollution is analyzing and preventing microplastics. There are several different ways to collect and identify microplastics, however more effective ways need to be introduced. This was the main topic of the article, *Analysis and Prevention of Microplastics Pollution in Water: Current Perspectives and Future Directions,* the authors relay the increasing dangers and impact of microplastics. They also look at possible solutions to help control and reduce microplastic pollution.

The article starts with a brief introduction on microplastics. The authors give a detailed definition of microplastics and the two classifications that they are usually put into. They emphasize the amount of pollution that is occurring by providing the reader with statistics and graphs that help show this increasing number of pollutants. A chart depicting the types of plastics found in microplastics is shown to relate the type of plastic to the items it can come from. Tools needed for the removal of microplastics are still outnumbered compared to the problem at hand.

Next, it focuses on the methods used for finding microplastics in water. Five steps are outlined and described in the article: sampling, separation, clean up, identification, and confirmation. An overview of the types of nets and methods used are summarized, as well as mentioning the potential disadvantages of these methods. One downside to sampling is the lack of a standardized sampling method for microplastics. The article also emphasizes the need for a better way to identify microplastics. Visualization is not enough to fully identify all microplastics since they can be mistaken for other materials. According to the authors research, physical analysis is a more dependable method to accurately separate microplastics from other debris. The article also mentions the lack of information available on certain areas where microplastics are present and effects it may have on some things, such as drinking water.

The next main point of the article is remediation strategies to help decrease the amount and effects of microplastics. Plans from other counties to reduce microplastic pollution are outlined. They include banning microplastic beads, restricting the sale and consumption of single use plastics, and making plastic packing more recyclable. Technologies such as engineering tools, use of biodegradable polymers, and biotechnological tools, are the focus of these remediation strategies. A new route for biodegradation, new biodegradable materials, and alternative ways to remove plastics may become the best methods to reduce microplastics, but there are still some issues that could arise. For example, biodegradable polymers are not always reliable and need certain conditions to be used to their full effect. Some of the new technologies also need to be researched more to determine the full extent of their effects.

This article did a great job of explaining the possible solutions that could help with the increasing problem of microplastic pollution. The research question of the article was, “How can microplastics be analyzed and prevented?”. The information presented in the article answered the question and provided detailed information on all of the topics mentioned. It not only explained the methods that could be used to reduce microplastic pollution but also gave an insight on the different ways microplastic data is collected. It raised questions about these methods and described possible problems and solutions to resolve these problems.

One of the strengths of the article was the organization. It read easily and each topic built on the information presented before it. Another strength of the article were the numerous graphs and charts that were included. They were visually appealing and condensed all the information into a clearer form. The numerous resources cited were also a strength of the article. The resources were reliable and recent, which makes the article more credible.

A weakness of the article was some of the word choices. In some instances, the wording of the article was hard to understand. Some words could have been defined or changed for the article to be read more clearly. Another weakness of the article was the lack of information on alternative methods to combat microplastic pollution. The article focused on methods already being used and the possible problems of these methods. It would have been a nice addition to the article to add some alternative methods that had not been used yet or are just now being newly developed.

The organization and design of the article was very good. As stated earlier, it was organized in a way that made it read easily and build on top of each topic as the article progressed. The graphs added a clearer understanding of the information being given. The different sections allowed for the information to be easily separated and distinguished from one and other. I feel that there is a great amount of room available for research in this topic area. Since micropollutants’ are a serious problem, we are in need of an effective solution that would benefit the environment without causing further damage. With more research and studies done on microplastics and how they can be reduced, more information can be available and more ideas and methods for solutions can be created. The article was very informative and gave new information about the topic. It was well thought out and very informative.

Another important aspect of reducing plastic pollution is implementing policies aid in the reduction. The final article highlighted in this literature review is, *Reducing Marine Plastic Pollution: Policy Insights from Economics*, the authors Abbot and Sumaila give detailed overview of marine plastic pollution, solutions, and policies. They highlight the different management strategies and policies that are or could be implemented to help with marine plastic pollution. The article also includes the potential areas where future additional research could be done.

The article starts by outlining some key points about marine plastic pollution to provide useful background on the topic at hand. According to the first point there needs to be a shift of attention, policy makers should focus on reducing the flow of plastic instead of looking for cost effective clean-up, since that idea is currently out of reach. The second and third points details where the majority of plastic pollution comes from and poor waste management. The facts listed in this section emphasize the need for a focus on other areas of plastic pollution, such as reducing the flow of plastic into oceans and policies on how plastic is gathered.

The next section focused on possible policies regarding marine plastic pollution and their advantages and disadvantages. The article also provides a well-organized chart that shows the different types of policies that can be implemented. The first focus is on retail bans and content standards, for example bans on single use plastic bags plastic straws. According to the authors, this does have the potential to significantly reduce plastic pollution, it cannot be proven as economically justified and acquires additional policies to achieve the desired outcome.

The next area of focus is price-based policies. Fees imposed on certain areas could potentially help influence production and disposal of plastics. The polices listed in the article were centered around waste disposal fees and two-part instrument policies. Fees on waste disposal could provide reduction of the production of plastic and provide incentives on disposal. Options include a fee that reflects full cost of disposal of the product or is a tax or fee on the final cost of the product based on social costs. However, these could be hard to implement and, in some cases, monitor. Different two-part instrument policies were mentioned. However, they all provide some form of refund for the proper disposal of materials. All of these different policies also provide incentives for implementing green designed products.

Some other factors that could influence marine plastic pollution are producer responsibility and behavioral interventions. Shifting the responsibility of collection and recycling to the producer of the product could encourage then to use green designs for their products. However, as of now, the effectiveness and efficiency of these policies are not really known. For behavioral interventions, influencing social norms is the main focus, but this is still not widely understood and the outcomes of it are also not fully known.

The last section of the article gives some different areas for research. Firstly, the economic damages of marine plastic pollution. Welfare effects, ecotoxicology of marine plastics, and the effects plastic pollution has on human health. Second, waste management policies. This calls for more research in informal waste management and incentives that could help with this area. Finally, international trade in recyclables. More research needs to be done in this area to help with the development of effective policies to combat marine plastic pollution.

This article did a very good job explaining the different solutions that could help with marine plastic pollution. The research question, “How can marine plastic pollution be reduced?”, was answered thoroughly in the article. It explained different policies and plans that could help with the reduction of plastic pollution. Not only did the article state the advantages of these policies, it listed the disadvantages. It also provided a good section about the future research that needs to be done to fully understand the effects of plastic pollution and create a plan to combat it.

A strength of this article was the use of graphs. The article did only use one graph, but it was very useful in breaking down the different policies mentioned. Another strength of the article was the resources used. It was back by credible and recent resources, which in turn made the article more credible. Another strength of the article was the readability of it. Difficult words were clarified, and the language used was easy to read for anyone, no matter their amount of scientific background.

A weakness of the article was the lack of explanation when explaining the policies. While they were explained in a way that was easy to understand, I felt that there could have been more background information given. By doing this the reader would have a better understanding of the policy and could better recognize why the advantages and disadvantages of it were listed.

The article was organized very well. It introduced key facts about marine pollution, then listed the polices in place or that could be implemented, and finally recommended areas where future research could be done. By doing this, the information built on top of each other and gave a clearer understanding of the topic. There is a lot of opportunities for future research. Just as the article stated more research could be done on the damages of marine pollution, waste management, and trade. By furthering research in these areas, more data can be collected in the effects of marine pollution and more effective policies can be made.

The four articles above all mention several similar key points. They all stress the importance of creating a solution for plastic pollution. It is becoming an increasing problem in our world. Without action and a plan to reduce the number of plastics that ends up in bodies of water, the negative effects will worsen. All of the articles call for an increase in our efforts to combat plastic pollution. They all point out different technologies and ideas that can be used to aid in the fight against plastic pollution, such as new ways to track plastics, bans on uses of plastic, new disposal methods, and new ways to collect pollution in the ocean.

There is a general agreement among the authors of these articles. All the articles agree that more research needs to be done. The articles agree that to successfully create a system that is effective in decreasing the effects of plastic pollution, more research and data is needed. New technologies need to be tested and new policies put in place to figure out what works best for our society. There are many areas where new research can be started and areas where research needs to be continued. They all also stress that the plastic pollution that is currently littering our environment will not disappear until plastic pollution itself is reduced.

Another agreement across the articles is the lack of information on the effects of plastic pollution. Most of the research done focuses on oceans, but there is hardly any research done on fresh bodies of water. There is also a lack of information on the effects the pollutions could have on humans, such as food consumption and wellbeing. As well as a lack of data there is also no standard way to record data collected. This is also a major issue, without a more standardized way to collect and record data, there is no way to ensure that all data collected is accurate across all research.

These articles do a great job at providing a great background on the information currently available on plastic pollution. They also indicate areas that need further research as well as introducing new ideas or systems that could aid in decreasing the effects of plastic pollution. I for one am very interested in the effects that these plastics and the way they may affect our future. These articles aid in explaining and providing necessary information on plastic pollution and negative impact that arise if action is not taken.

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