Project Title

How and why do Jellyfish Blooms Affect the Environment

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Team Number
1008
School Name
Taos Middle School

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Executive Summary

The problem we are investigating is how and why jellyfish blooms are taking over the world's oceans. This could be a serious problem. That is why we have tried to find a solution to stop jellyfish blooms from affecting the environment. We have three possible solutions, the use of Gobies to eat the jellyfish, catching the jellyfish to test on their venom to see if it could cure cancer, and getting the government to pass a law to decrease sport and commercial fishing. With our model we conducted experiments with the number of gobies being used, and the number of jellyfish that hatched in a bloom, using sliders. We expect our first solution to take 3 to 5 years to be completed. For our second solution we expect it to take 2 to 3 years to be completed. For our third solution we expect it to take 8 years if not more to complete and or solve. Our conclusion to this project came out like expected. In our project/model we focused mainly on the use of our first solution, the gobies. Using our first solution, the gobies, we concluded that the use of them eating the jellyfish could possibly work. With our results that we found we believe that scientists/ people of America should look into our solution that could possibly solve this serious and deadly problem. In the future we would love to keep going with this project, if possible. We want to keep going with this project because we have not finished it yet. We have only made a model and experimented with our first solution, we want to research more and make a model of our second and third solution too. We achieved with this project. We achieved the goals of finishing, using Starlogo TNG, working as a team and having fun.

Problem Definition:

The problem we are investigating is how and why jellyfish blooms are taking over the world's oceans. Jellyfish populations are increasing because of higher water temperatures, and too much commercial fishing. Too many jellyfish means less fish and more human injuries. This could mean thousands of human's jobs/lives, and sea creatures affected. This could be a serious problem. That is why we have tried to find a solution to stop jellyfish blooms from affecting the environment.

Problem Solution:

One possible solution that scientists have suggested is the use of Gobies (a small fish) to eat the jellyfish. Since Gobies are endangered, scientists would have to breed them which would solve their problem, and since gobies eat jellyfish they would solve our problem too. A Gobies diet is anything that doesn't have a vertebrae. As you all know jellyfish don't have vertebrae's so, if we were to release Gobies into the Gulf of Mexico, Mediterranean, Black Sea, and Yellow and Japan Sea's (all of the places where the jellyfish blooms are) the Gobies could eventually even out the population of jellyfish. If the population of jellyfish ever evens out, the human injury risk, and fish population will also even out.

Our second solution would be to try to get the government pass a law to decrease sport fishing (where they use Gobies as bait), and commercial fishing (where they make it easier for the jellyfish to bloom) so that there would be more fish to eat the jellyfish, and less room for the jellyfish to spread.

Our third and final solution would be to take commercial fishing boats and use them to capture the jellyfish so that scientists could test on their venom to see if it could work for curing cancer. This solution would be a very important solution if it works because it would not only solve the jellyfish blooms overpopulating but it would also save thousands of lives from being lost to cancer.

With our three solutions all having 3 or more years needed to be completed we feel even though these projects are big and take a while that they are worth it if the results come out like we expected.

Verified and Validated Model

With our model we conducted experiments with the number of gobies being used, and the number of jellyfish that hatched in a bloom, using sliders. Our experiments on the number of gobies started at 200. With 200 gobies all of the jellyfish were wiped out. After that we went down to 100 gobies, which was not enough, this time the gobies got wiped out. So after the two failed tries we met in the middle with 150 gobies, this try was an accomplishment. What I mean by accomplishment is that the gobies ate most of the jellyfish and evened out their population along with the jellyfish populations. Our experiments on the number of jellyfish in a bloom started out with 20, this caused too many gobies and no jellyfish. Next we tried 60 jellyfish in a bloom, with these numbers we had a lot of jellyfish and not enough gobies. Finally we went down to 40 jellyfish in a bloom which was a perfect number because in that test when we had 40 jellyfish in a bloom and 150 gobies we had a perfect model with expected results in it.

Expected Results:

With our first solution we expect the jellyfish population to go back to normal along with the Goby population to go back to normal as well in 5 to 7 years. We expect our first solution to take 3 to 5 years to be completed. For this task to be completed scientists must breed Gobies which will take roughly estimated 2 to 3 years to get enough Gobies to eat most of the jellyfish. Then it will take 1 to 2 years to release all of the Gobies to the places around the world where the jellyfish are blooming and to eat the majority of them. This solution could take 7 years if not more to be completed.

For our second solution we expect it to take 2 to 3 years to be completed. For our law to be passed it must go through all of the members of congress to be approved, and if the law is not passed it could take a number of other years to be passed. This solution could take 3 years if not more to be completed.

For our third solution we expect it to take 1 to 2 years to catch the jellyfish and give them to scientists for testing. This testing could take roughly estimated 5 to 6 years to test on over 2,000 classified species or even more if they test on unclassified jellyfish too. This solution could take 8 years if not more to complete and or solve.

Conclusion

Our conclusion to this project came out like expected. In our project/model we focused mainly on the use of our first solution, the gobies. Using our first solution, the gobies, we concluded that the use of them eating the jellyfish could possibly work. We came to this conclusion by conducting experiments with the number of gobies being used, and the number of jellyfish that hatched in a bloom, using sliders. With our results that we found we believe that scientists/ people of America should look into our solution that could possibly solve this serious and deadly problem. Even if there is a chance of our solution not working as planned it is worth a shot to try. If our solution does fail then we have two other solutions. The cancer research solution and passing a law to decrease sport and commercial fishing. In the future we would love to keep going with this project, if possible. We want to keep going with this project because we have not finished it yet. We have only made a model and experimented with our first solution, we want to research more and make a model of our second and third solution too.

Significant Achievements

Delaney's Achievements: From this Challenge I achieved a lot. I learned a lot about how to use Starlogo TNG, jellyfish, gobies, and about this serious problem that we can possibly solve. I also achieved my goal of finishing my first year of Supercomputing!!! But, most of all I learned about using jellyfish venom to possibly cure cancer, and with this new knowledge I hope to be a successful scientist in the future. But without this knowledge supercomputing gave me I might've been teaching at the Taos High School in the future, but now I can be an Oceanographer, so I thank supercomputing dearly for the knowledge I've been given, and the fun I've had learning it.

Lena's Achievement: This challenge has given me the chance to accomplish many things such as using new computer software (Starlogo TNG.) Also I have faced my fear of being in front of an audience. From the research I have learned about goby fish, habitats of jellyfish and this serious problem in our world that we studied. I enjoyed the experience to have an experiment with animals, and not actually hurt the animals we studied. Thank you supercomputing!

McKenzie's Achievements: My achievements over the time I have been in supercomputing is that the ocean in more threatened than the life on the surface. For instance there is less oxygen in the water than the air we breathe. Another achievement of mine is learning more about the world and not just in Taos, New Mexico. The ocean is a big part of Earth, so it has a lot to teach me. But, I had fun and I also learned a lot more about computer software which might help me in the future to get a job. I achieved my goal of being part of a group.

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The software we used was Starlogo TNG for the model, Microsoft Office Publisher for the power point, and Microsoft word for the report.

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Background Research

What is a jellyfish?

A jellyfish is an invertebrate that is made up 98% water, and incredibly doesn't have a brain, head, ears or eyes. Since the jellyfish doesn't have senses it is called a simple-bodied organism. Its sense of direction comes from sunlight which tells it to go up or down, that is the only sense of direction it has. The jellyfish despite its name is not a fish. They belong to the Cnidaria phylum. (Which also includes coral, and sea anemones.)

Life cycle of a jellyfish.

The life cycle of a jellyfish starts out with a planula larval. This planula larva will then turn into a polyp. After the polyp stage it will turn into a strobila. Next the strobila will turn into an ephyra. Lastly the ephyra will turn into medua or the adult jellyfish. The adult jellyfish's life span depends on the type of jellyfish it is, but the average life span of a jellyfish is two days to a year.

How many jellyfish species are there?

There are 2,000 species of classified jellyfish, but there are many more waiting to be discovered and classified. Some of the more popular jellyfish that are classified are the moon jellyfish, the box jellyfish, the Atlantic sea nettle, the lion's mane jellyfish, and the upside down jellyfish.

What is a jellyfish bloom?

A jellyfish bloom is a mass amount of jellyfish traveling together otherwise known as a "smack" of jellyfish. These "smacks" of jellyfish have been killing off fish, decreasing oxygen levels in the ocean, and have been affecting human lives, and jobs for a few years now.

How many jellyfish are in a bloom?

A jellyfish bloom consists of lots of dangerous jellyfish. For example, in large blooms there can be as many as 100,000 jellyfish. Hence, jellyfish blooms are very dangerous to ocean creatures, and to us. This is why we are looking for a solution to these life threatening blooms.

What causes the jellyfish to bloom?

There are a few reasons to why the jellyfish will bloom. These causes include warmer water temperatures due to global warming, too much sport and commercial fishing, and pollution. Pollution causes the higher water temperatures because with all of the waste on Earth we have

created a hole in the o-zone layer which is causing global warming which leads back to higher water temperatures.