

Human Impact on an Ecosystem

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Supercomputing Challenge
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Team 2
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I: Executive Summary

This model is designed to see the kind of information we will need to make the same kind of model on a much larger scale in the next few years. Our team is currently modeling an ecosystem and intend to later (probably starting year after next) have humans begin to populate and move through the area. We intend to make a complex biological model with many factors to show the effect that humans have on ecosystems. We will show an area in which humans are directly interacting with the wildlife, not just the effects of global warming and air pollution. We intend to expand with a new programming language and many more agents. We also intend to include factors and variables like water pollution, deforestation, air pollution, and global warming.

II: Statement of Problem

Humans are having a huge impact on the ecosystem, and not in a good way. We are attempting to model the effects of a human-like invasion on the natural world. The key problems that will appear in the model are construction, deforestation and pollution. The way cities are formed and the kinds of energy are destroying our natural system and we need to find a reasonable way to change it. Current rates of pollution and deforestation have and will continue to have very negative impacts.

III: Method of Solution

We are using Starlogo TNG to solve the problem, though intend to switch to a stronger software. The first thing we did was research how cities are generally formed. We then found out what kind of animals live in the areas and chose a consumer, secondary consumer, and producer. We will create a species that acts similarly to humans and show what happens when they change the natural flow.

Model: We will program a self sustaining ecosystem which will then be exposed to a human like agent which will build a road through the forest diverting water and killing some of the flora and fauna. The animals will have to find a new place to get water and learn to avoid the road and small settlements. We intend to try new road designs and alternate building material to try to cause less damage to the environment.

IV: Results of Research

The research that we have done has made it fairly obvious to us that humans have had a very negative impact on the environment. While not everywhere has been affected on the same level, there has been negative impact almost everywhere. Some examples (like the Gulf Oil Spill) are truly horrid. It also seems that with effort the effects that humans have had can be (for the most part) either made positive or made to have no effect.

V: Analysis of Results

We have not yet put human effect into our model, that is a future goal. We are working on getting a model of a self-sustaining ecosystem with at least three levels of life (at least one producer and two consumers).

VI: References and Software

We used StarlogoTNG for this program. We believe that next year we will have to learn another

programming code as Starlogo does not have enough power for this. We intend to start learning Repast, Java, or C# next year. We used the following websites in our research

<http://www.dogbreedinfo.com/pets/rabbit.htm>, <http://en.wikipedia.org/wiki/Rabbit>, <http://www.thepiedpiper.co.uk/th14%28a%29.htm>, http://en.wikipedia.org/wiki/Gray_wolf, <http://www.michigan-sportsman.com/forum/showthread.php?t=94685>, and http://www.wolfsongalaska.org/tech_info.html.

We also had interviews with Melissa Gibbons and Matthew Lewis (PhD), as well general advice from parents and mentors.

VII: Most Significant Original Achievement

Our most significant original achievement on the project was probably figuring out a way to make the apex predator eat the primary consumer more realistically. We all noticed that in Starlogo, the death occurred immediately with no remains, whereas it takes wolves time to eat the rabbits to the point at which only bones remain.

VIII: Acknowledgments

We would like to thank our parents, Mr. Woodd, Ms. White, Mrs. Schweizer, Melissa Gibbons, the staff, and our fellow students for offering their support and advice.