

Sydney Paul
Term Summery
April 23, 2017

Research has led to the prediction that Planet Earth is currently faced with a rising loss of species that is suggesting a sixth mass extinction. In the past, the first five extinctions– which occurred during the Permian, Ordovician-Silurian, Cretaceous-Tertiary (K-T), Triassic, and Devonian, were triggered by natural disasters, each of which wiped out between fifty and ninety percent of all species on the planet. [1] The sixth extinction is believed to be different in the sense that the causes were not due to nature at all, but rather by the actions of humans. Humans are the leading cause of the destruction of land and resources like trees, rock, and plant life. The invention of agriculture required clearing lands to farm which dramatically transformed landscapes and has been projected as a major cause and starting point of the sixth extinction. [4]

Essentially, the sixth extinction is different from the past five because of human involvement. [4] Because of stress on the ecosystem and species with human transformation of landscape, Earth and its inhabitants have become endangered. Humans have cleared land for many reasons, the first being use for agriculture. [4] Other reasons include cutting down trees for building materials and urbanization. [4]

Because humans dramatically transformed landscapes and habitats, barriers were broken down and biological invasions occur. [6,7] Humans have caused a rearrangement of Earth's ecosystems through the mixing of plants and animals that have been isolated in their own natural habitats for so long. [7] Some species invasions dominate and destroy the habitat being invaded as well as introduce disease, lessen biodiversity, and cause extinction.

There are many more factors other than agriculture that are contributing to the sixth extinction. Some of which have resulted from agriculture and the growth of the human population, and some from other sources. One for example, are increased levels of greenhouse gasses. There are two ways that greenhouse gas emissions enter our atmosphere. [10] One way is through human activities like fossil fuel use, deforestation, intensive livestock farming, use of synthetic fertilizers, and industrial processes. [10] The other is through natural processes like animal and plant respiration. [10] Why greenhouse gas emission is a bad thing is that these gasses trap heat in the Earth's atmosphere and the human activities mentioned above increases the amount of gas entering the atmosphere and contributes to the warming of Earth's surface. This is dangerous because this warming of the surface will increase surface temperatures and alter the world's climate. [2] Thus, species will be forced to migrate farther north to find habitats with like climate conditions. [2] Scientists predict that if the surface temperatures rise 7.7 degrees Fahrenheit, that 16 percent of species will be lost. [2] With this, the ultimate outcome and concern is global warming. Ecologists, conservation biologists, and climate scientists believe and have predicted that if average temperatures rise two degrees Fahrenheit, that 5.2 percent of species will be lost. [2] Forests store large amounts of carbon, trees and other plants absorb carbon dioxide from the atmosphere as they grow. [13] Carbon dioxide is converted into carbon and stored in the plant's branches, leaves, trunks, roots and in the soil. [13] When forests

are cleared, or burnt, stored carbon is released into the atmosphere, mainly as carbon dioxide. [13] The main issue is that the lack of trees reduces the ability of land to absorb carbon dioxide. Deforestation accounts for around 18 percent of all global greenhouse gas emissions due to human activities. [13]

In my creative work, I wanted to visually portray a world with agriculture and the effects that humans have on the environment because of it, and compare it with a world without agriculture. I created two pieces, one which illustrates a world with agriculture, and a second piece which illustrates a world without agriculture. [1,4].

How I illustrated deforestation in my first creative piece is by drawing many tree stumps all around the drawn landscape from cut down trees. I also have a large farm built right in the center of the piece, since one reason for clearing out lands is to make room for farms, and to use the cleared-out resources to build them. In my second piece, I drew an abundance of trees to illustrate that without human destruction, certain ecosystems would be more fruitful with an abundance of resources.

As said above, the destruction of habitats leads to invasions of species. How I show the invasion of species in the first piece is through raccoons. Many species have barriers to keep them from invading, and the presence of a river is a natural barrier for raccoons, separating them from other species. [12] However, in the first piece I have a dried-up river, which I will address later in this summery, allowing the raccoons to enter the land. How I showed this was by drawing a group of racoons with suitcases physically moving into the land. How I show these racoons becoming invasive is by drawing the racoons ransacking garbage cans left out by humans as well as raiding food stashes of other species living there. I chose racoons because they benefit from human populated areas because humans often provide food for them in a way. Humans do not benefit from racoons because racoons can carry diseases like rabies and are treated like pests, making them an invasive species. [12] Another way I show that the racoons are being invasive is by having the racoons raid a stash of acorns stashed by squirrels. Raccoons prey on squirrels as well as eat acorns, so by having the racoons steal the acorns, they are depleting the squirrel's resources and are essentially driving them out of their environment. In the second piece, I have the same squirrel happily in his environment holding and cherishing his acorn while a flowing river in the background keeps the racoons from invading.

In my first piece, I needed a way to illustrate greenhouse emission. Since deforestation contributes to greenhouse gas emission because the lack of trees reduces the ability for land to absorb carbon dioxide, I drew carbon dioxide atoms hanging in the air, unable to be absorbed. Also, because of this gas emission, geoscientists are saying that climate changes are decreasing river flow by five to twenty percent due to less precipitation which will lead to longer lasting droughts. [14] Higher overall air temperatures will mean more water lost to evaporation. [14] So in my first piece, the river that once was a barrier to the racoons is now dried up from increasing temperatures, which in turn allowed the racoons to become invasive. Whereas, in my second piece, I drew the same river, however, it is high and flowing because greenhouse gasses aren't being as intensively emitted. I also drew an exploding thermometer that has been stuck in the ground in my first piece to show the increasing temperatures.

The last visual I have is in my first piece are large herbivores like rabbits, happily eating carrots in peace. These bunnies can happily eat in peace because their large predators like wolves, do not hunt well in human populated areas due to their need for hunting in wide open spaces. However, in my second piece, I have the same happy bunnies, but this time they are being stalked by the wolf who can now hunt them because he is in his world, a world without humans, where he can hunt freely.

My audience for my creative work is for those who are not well educated on the issues that are happening to our Planet Earth from human destructive behaviors. My pieces are more on the humorous side because I want them to be approachable and somewhat easy to put together. I also want the viewer to possibly question why I depicted the scientific idea in the way I did, and maybe do some research, or have a conversation about it.

Bibliography

1. Eldredge, Niles. "The Sixth Extinction." *ActionBioscience*. June 2001.
http://endangeredink.com/programs/population_and_sustainability/extinction/pdfs/Eldridge-6th-extinction.pdf

This source has a wealth of information on the sixth extinction including facts, statistics, projections, and a breakdown of everything related to the sixth extinction. The article discusses what the sixth distinction is, the past five extinctions, the main causes of the event, its continuation, and conservation measures. This article has fueled much of my research in laying out an outlined paper hitting important topics and ideas.

2. Gittleman, John. "Extinction." *Encyclopedia Britannica*. February 15, 2017
<https://www.britannica.com/science/extinction-biology>

This source lays out general information of extinction, like what it is and how it happens. The article touches on extinction rates which helps illustrate how common extinction is along with the information given on mass extinction distinguished by the fossil record. The article is more for foundational purposes to build my research, points, and ideas upon.

3. Kaplan, Sarah. "Earth is on brink of a sixth mass extinction, scientists say, and it's humans' fault." *The Washington Post*. June 22, 2015.
https://www.washingtonpost.com/news/morning-mix/wp/2015/06/22/the-earth-is-on-the-brink-of-a-sixth-mass-extinction-scientists-say-and-its-humans-fault/?utm_term=.a621d36d7ed8

This article lays out basic information about the sixth extinction. I mainly used this article for facts and projections of where Earth is headed and the damage we have caused.

4. Kolbert, Elizabeth. *The Sixth Extinction: An Unnatural History*. Henry Holt & Company, 2014.

*At Pratt Library

In this book, the author shares her research for a concerning issue, which is that we are currently in the middle of another wave of mass extinctions. In the beginning, she briefly describes the evolution of humans. She states that people, both prehistoric and otherwise, are not particularly strong, swift, or fertile. They are, however, resourceful, and as our adaptability continued to grow, the landscape alterations that eventually followed led to a huge decrease in biodiversity. That diminished biodiversity, she claims, may be behind the so-called sixth extinction. She then goes on to discuss the species which are truly endangered and the steps she believes we need to take to prevent their extinction. This book gives a lot of background on the concerns of extinction with both human induced as well as natural order.

6. Vitousek, Peter M., Harold A. Mooney, Jane Lubchenco, and Jerry M. Melillo. "Human Domination of Earth's Ecosystems." *Science* 277, no. 5325 (1997): 494-99.
<http://www.jstor.org/stable/2892536>.

This journal is a great source outlining the sixth extinction from its start, causes, and where we are now. The journal hones in on the specifics done by humans to cause the sixth extinction. The journal also focused on the results of the damage being done and how these are contributing to extinction. I used this article for much of my research and for the outline of topics.

7. Wall, William. "Extinction." *Biology Reference*. Accessed February 18, 2017
<http://www.biologyreference.com/Ep-FI/Extinction.html>

This source sheds light on a few causes of extinction starting first with environmental change and how species survive by adapting to their environment and what happens when they are unable to. The article then transitions into discussing mass extinctions and with examples. There is mention of human influence, population increase, agricultural expansion, and deforestation as major threats and causes of extinction. This article sort of answers the question of how common extinction is by the leading examples provided, but I think the article is more useful towards the causes of extinction.

10. "Green House Gas Emissions- Main Sources." *What's Your Impact?* Accessed March 23, 2017. <http://whatsyourimpact.org/greenhouse-gas-emissions>

This article supplies a wealth of information on greenhouse gasses and the main sources that create them. I used this article to give basic information on what greenhouse gasses were and used other information to illustrate how these gasses are effecting our planet.

12. Arjo, Wendy M., Christine E. Fisher, James Armstrong, Frank Boyd, and Dennis Slate. "Effects of Natural Barriers and Habitat on the Western Spread of Raccoon Rabies in Alabama." *The Journal of Wildlife Management* 72, no. 8 (2008): 1725-735. <http://www.jstor.org/stable/40208455>.

This article talks about raccoons as an invasive species with the damage they do to urban society's as well as the diseases they bring such as rabies. The article also talks about natural barriers that keep raccoons from invading certain environments. I used this article when talking about invasive species.

13. "How Does Deforestation Contribute to Climate Change?" *Climate Council*. October 19, 2013. <https://www.climatecouncil.org.au/deforestation>

This article gives a small amount of information discussing how deforestation contributes to climate changes and provides the breakdown of causes and effects. I used this article to discuss greenhouse gasses and how deforestation is a major cause.

14. Zielinski, Sarah. "The Colorado River Runs Dry." *The Smithsonian*. October 2010. <http://www.smithsonianmag.com/science-nature/the-colorado-river-runs-dry-61427169/>

This article mainly talks about the drying up of the Colorado river, however there is a detailed section that talks about climate change effecting multiple sources of river. I used this article to provide evidence that climate change can and is effecting our rivers.



