

Tapping into Ice Age Extinctions: the Megafauna is Us

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There are few people who could positively and accurately picture what North America looked like 13,000 years ago. Many may expect it to look similar to present day. Truth is these expectations are far from correct. Instead, North America was a land mass populated with animals so large we only see them today in our city zoos. Mammoths, sloths, and saber-toothed tigers roamed our most urbanized areas. These beasts once grazed ground that we have since smothered in concrete, walked on land that now houses our largest factories, and raised their young where our children now play. These large mammals flourished and survived on this land for centuries, until their mysterious and drastic disappearance. Several enthusiastic scientists across the world have dedicated their research to unlocking the secrets of the disappearance of these Ice Age giants. In *Once and Future Giants*, Sharon Levy paints an immaculate picture of the possible reasons for these mass extinctions. She is unbiased and proposes several hypotheses. She begins with the most simple, and becomes increasingly complex throughout her writing.

To begin, it is easy to blame climate change for the mass extinctions, which resulted from the Ice Age. Logically, as ice melts and the climate warmed, many animals would simply be unable and unfit to survive. Whether due to size, resource use, or evolution, many animals simply could not adapt to a warming environment. For many years, and even to many individuals today, this was the common and accepted reason for the Ice Age extinctions. Upon closer look, though, it is clearly more complex. If this were true, nature's smaller animals would have died out much sooner and more dramatically. Instead, nature's beasts, the largest and most powerful mammals were the ones to suffer the most.

The proposal that climate was not the cause of Ice Age extinctions results from several advancements in scientific technology. As new methods to study emerged, the true complexity of these extinctions was revealed. As a result, longstanding assumptions in paleoecology had to be reconstructed to fit the newly discovered patterns of the Pleistocene's megafaunal decline. Technology that has led to radiocarbon dating and DNA sequencing proves that climate was not the only culprit. Warning signs, such as a loss of genetic diversity seen in the woolly mammoth, point responsibility towards someone totally different. The responsibility is placed on humans.

In debate about these extinctions, there is one consistent piece - extinctions began upon human arrival. As the Clovis people, some of the earliest humans, began to perfect their hunting technique, they were able to kill larger and more powerful beasts. The patterns of extinction in Pleistocene megafauna follow the emergence of more intricate hunting tool technology.

In studying population dynamics throughout the semester in Biology 220, it becomes evident that ecosystem maintenance is dependent on even its largest predator. In the absence of this predator, oftentimes by human removal, the composition of the ecosystem (its smaller mammals, insects, trees, and plants) changes. Since these large predators control the composition of the species populations on which they feed, the loss of a top predator results in herbivore population explosions. Since the food source of these predators is no longer in danger, their population also booms. As we have learned, the drastic changes in the composition of different species in an ecosystem have dramatic effects.

A superb example of this can be seen on the Kaibab Plateau in Arizona. With the introduction of hunters to this area, all of the top predators were killed off in a matter of years. In their absence, deer populations exploded. This increase in deer populations greatly altered the habitat. Because of this, it comes to no surprise that conservation efforts often resort to reintroduction of the ecosystem's most effective predator. This reintroduction enables a trophic cascade, allowing the predator to control populations below it.

Perhaps humans are not the sole cause of Ice Age extinctions, but their arrival to North America had everlasting consequences. Maybe we should be less concerned with controlling pest outbreaks in our homes, and realize that humans are, in fact, the most invasive of species. In reading *Once and Future Giants*, it is difficult to overlook the inevitable global warming that plagues today's world. As taught in Biology 220, a warming climate has dramatic implications. Today, as glaciers retreat in many once-cold areas, entire ecosystems are beginning to be altered in response. Our largest animals are faced with similar dangers as their Ice Age counterparts. Polar bears are beginning to lose seals as their major food source because the seals have retreated from the coasts. As a result, polar bears have begun to attack their own species. Loss of the polar bears would have unfortunate consequences on the ecosystem in which they live. The same Ice Age trends can be seen in present day.

Although humans have been around for a long time now, their impact becomes even more dominant as technology increases. However, with increasing interest in the megafauna of the past, scientists become more focused on how these answers can benefit today's world. The hidden secrets of yesterday's extinctions can help us move forward. The loss of today's megafauna, though not as large and magnificent as the woolly mammoth or ground sloth, would have a detrimental and every-changing impact on ecosystems. Humans have become accustomed to their own lifestyles, and many do not realize that much of the actions that have led to our greatest technological discoveries, urbanization, and modernization, are killing off very necessary components of the ecosystem. While it is extremely easy to detract attention from conservation efforts in the modern world, it becomes increasingly important to learn how to adapt to our changing environment.

Once and Future Giants compiles years of research and debate into an easy-to-read account of Ice Age extinctions. Sharon Levy, who studied Biology at the University of Illinois- Champaign and Oregon State University, does a superb job of reporting the story, while keeping present day implications in mind. Despite her science background, her writing is geared toward the general audience. Although she does present many intricate

scientific ideas, she is effective in explaining them to the projected audience. She smoothly connects the mysterious story of Pleistocene extinctions with present day conservation ideas, all while capturing the ingenuity and passion of each opposing scientist. Although there are many conflicting hypotheses and numerous gaps to still be studied, Levy paints a detailed and illustrious picture of Pleistocene megafauna, while simultaneously teaching a lesson about possible present day extinctions. I would recommend this book to ecologists, students, and anyone interested in learning from the past and conserving our future. *Once and Future Giants* is an eye-opening piece that provides a glimpse into yesterday's world.

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