Limits of the Human Population
Jeb Polstein
Westchester County
Hastings High School
For the majority of humans’ time on Earth, our population has been relatively stable. The past few hundred years, however, have exhibited exponential growth, driven by rapid modernization and increasing resource availability. In nature, such exponential growth is rarely maintained for long, as intraspecific competition and other population controls tend to stabilize populations around a certain carrying capacity. Thus, ecologically one would expect human population growth to eventually reach such a carrying capacity and show logistic growth, but our unique manipulation of nature complicates this assumption. Whereas some would argue that human ingenuity will allow indefinite growth, it may be that aspects of these very innovations, regarding energy, transport, agriculture etc., are coming around to limit our growth as a species. Unsustainable human activities, coupled with the finite nature of vital resources, will eventually limit population growth, but when and how we hit this limit depends largely on our restorative actions in the coming decades.

As we are beginning to discover, modernization comes at a steep cost. Our innovations, from the combustion of fossil fuels for energy to industrial farming, have adverse effects on the environment. For one, the byproducts of chemical operations, large-scale farming and simple human disregard are heavily polluting the environment, threatening the quality of the air we breathe and the water we drink, as well as the health of the organisms we rely on for food. As the population rises, such pollution will most likely increase, especially among the growing contingency of those living in poverty without adequate methods of sanitation and waste disposal. The larger issue here, however, is that of greenhouse gas driven global warming. This is of especial concern in the developing countries forced to burn more fossil fuels to meet the energy needs of their emerging factories. Trapped solar radiation could raise temperatures on Earth as much as 10 degrees Fahrenheit in the not too distant future, consequently raising sea
levels, melting glaciers and contributing to heat waves, droughts and other severe weather events. Elevated sea levels of just several feet could decimate coastal areas and infiltrate freshwater reserves, potentially leading to population-limiting disease as infrastructure collapses and compounding the water stress that so many are already experiencing today. Furthermore, when Himalayan glaciers have melted away, over a billion Asians will find themselves without water, and with changing weather patterns droughts will most likely increase (Engelman, “Revisiting Population Growth”). Thirsty people may resort to unsafe water supplies, spreading disease already predicted to increase with warmer habitats for insect, viral and bacterial vectors. The aforementioned droughts and extreme weather will also take a toll on agricultural output, especially where industrial-scale monocultures threaten to be wiped out by a single catastrophe. Ironically, our attempts to maximize our precious finite resources are in danger of depleting them.

Thomas Malthus, an 18th and 19th century demographer, argued that exponential increases in human population would eventually outpace our capacity to produce food. As a result, the poor would starve, with famine limiting population growth until slowly increasing food production caught up (Wilson). It may be that we are experiencing this disparity between population and production today, as nearly one billion people on Earth are malnourished (2012 World Hunger). More likely, though, is that hunger stems from uneven allocation of resources—the world’s rich are in no immediate danger of starvation—and that more efficient distribution of food, as well water, could save many lives. (That being said, at the risk of sounding morbid, one could argue that saving present lives may take future lives, if human society is able to fight off carrying capacity even longer.) Food and water are not the only crucial resources in danger of depletion, as hastened crop production has deprived soil of nutrients such as phosphorus,
potassium and nitrogen. Even the most efficient nutrient recycling may not act fast enough to avoid a calamitous drop in harvests (Engelman, “Revisiting”). With our continually overuse and climate-induced stresses, it may require a second green revolution for farmers to produce enough food to sustain the world’s population growth for another century.

By now it should be clear that if population continues to grow exponentially, humans will simply run out of resources and begin to die off. Today’s scientists and engineers are continually improvising methods to delay this inevitability, but after a certain point these will prove futile, and may even backfire. Therefore, population growth can slow and stop one of two ways: either by mass starvation, first of the poor, as resources become ever more scarce, or by a simple but substantial reduction in fertility rates. Obviously, curbing fertility rates is the more attractive option—a preemptive strike to minimize the tragic effects of overshooting our environment’s carrying capacity. As developing countries undergo industrialization, according to Warren Thompson’s model of population change, they eventually begin to decrease in population. Citizens cannot afford to suffer through the period of rapid growth that precedes this post-industrial baby bust, however; women should be educated and empowered to make their own reproductive choices, especially in developing countries, and encouraged to resist harmful cultural norms. Though social boundaries make such education difficult, population control campaigns have proved somewhat successful in India and Kenya, among other nations (Krock). In fact, the ambitious goal of giving women choices could bring fertility rates below replacement level, according to surveys (Engelman, “The World at 7 Billion”). Even with decreased population growth, however, resource consumption must be limited, so sustainable energy production and farming practices must be exercised. Earth’s human population will eventually level out, but the manner in which it does so will determine our future quality of life.
Works Cited


