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Is Humanity Improving?

In 1903 the Wright Brothers took the first controlled flight in mankind's history. The first time man has ever flown in hundreds-of-thousands of years of existence. Sixteen years after mankind's first flight, we flew across the Atlantic Ocean, a trip that previously took weeks to sail. In 1947 Chuck Yeager flew faster than the speed of sound. Fourteen years after breaking the sound barrier, the Soviet Union sent the first humans into space. Mankind walked on the face of the Moon- previous culture's God, in 1969. In the span of 66 years, not even one lifetime, our species went from our first flight to walking on the surface of the moon. We, as a species, have taken huge steps to improve ourselves and our way of life. But is humanity actually improving, or is just our way of life?

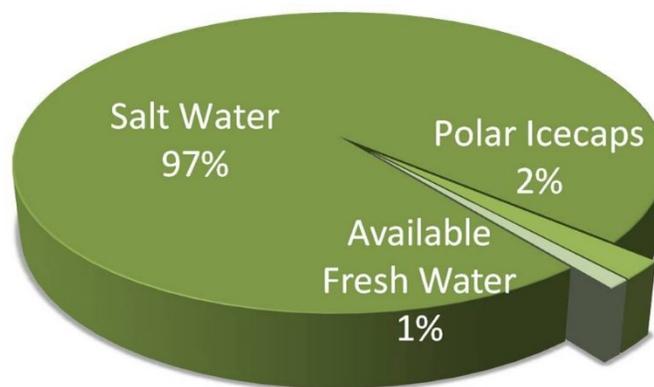
To begin we have to understand what improving means. There needs to be a set of guidelines that attempt to set a standard as to what improving is and if we are accomplishing it. Improvement can mean different things to different groups of people. Some will say staying in the 1800's, with basic home needs and living in the wilderness is ideal. Others say where we are now will suffice, with cars and reality TV. Finally, others will claim we need to go further, that humanity is destined to leave Earth and live among the stars. But these are only surface conditions; humanity can only be in those positions with the expansion of knowledge from past generations. The cornerstone of humanity's improvement hinges on gaining knowledge. Without new knowledge, we as people are lost and seem to have little purpose. The baseline for "improving" will therefore be: are we gaining more knowledge? Our gained knowledge cannot be trivial either. What we learn must be able to benefit our species. The fact is there is a lot wrong in our world. There is still a lot of room for improvement. If we get bogged down in every detail of why everything is wrong, nothing will ever be done. Humanity needs to focus on the larger issues and resolve them while we can. The larger issue is simple: humanity cannot continue as we know it. Humanity cannot continue developing technology at its current pace. We cannot continue our population growth. We cannot continue our global conflicts. Earth does not have the resources necessary to sustain us. We must improve ourselves, our way of life, and our planet if we have any hope to continue as a species. Our innovations thus far have served to direct us in the eye of extinction and we must continue to grow our knowledge to prevent the destruction we created. All of our innovations have led to longer life spans and increased resource use. These factors are what will cause humanity to collapse in the near future.

In 1950 the global population was around 2.5 billion people. Today the global population is 7,334,751,415. By the time your eyes read that last sentence, the population increased by around 100 or so people. It took our species well over 10,000 years to reach the population of 2.5 billion people, yet in the span of less than 70 years – again less than one lifetime- we doubled our population ("Human Population: Population Growth."). Every second we get closer to tripling what we were in the 1950's as our population approaches 7.5 billion people. ("U.S. and World

Population Clock”). A fact many people do not want to face is that we are creating our own doom. Earth cannot support this growing number of people indefinitely. In fact, it barely handles the population now. We as a species need to control this skyrocketing population or we will not have the basic necessities to live. Many may not even have water to drink if we continue on our current path.

Water is the number one factor in human survival. Human bodies are 65% water, and we can only live for 3 days in an outdoor environment without water. Any source of water will not suffice either. It must be relatively clean or a person can get violently sick, leading to death faster than they would without the water in the first place. (Binns, “How long can a person...”). Because of this, civilizations were built and destroyed by water. You couldn’t start a town or empire without a water source for your people. With the rate our population is growing, we will very soon run out of the groundwater that has sustained all of humanity for tens-of-thousands of years. Humanity settled into an agrarian lifestyle around 8,000 to 10,000 years ago. Pre-agrarian, humans would follow sources of water such as rivers and streams and drink from there. As humans settled into more of a hunting and agricultural lifestyle, villages formed around sources of drinking water. Water procurement was never even a concern for humanity for thousands and thousands of years, until large towns emerged that local streams couldn’t sustain (“How did the first humans live”). It wasn’t until the Roman Empire, in 300 BCE, that humans brought water from outside sources using aqueducts to sustain the town. (Schram, “...Roman Aqueducts”). Looking at how humans gathered water from the beginning of time until now, there is one common factor: it is all naturally occurring ground water. Humans aren’t creating water from the hydrogen and oxygen in the air. We are not pulling it from the ocean. We are taking it from the natural fresh water that’s available. This is an issue since much of Earth’s water is not even potable. While over 70% of Earth’s surface is water, less than 3% of that is fresh water. Of that 3% freshwater, most of that is frozen in glaciers, leaving less than 1% of Earth’s water as potable (Multiple Authors, "Earth's Freshwater.").

Water on Earth



As noted above, we see the vast majority of Earth's water is in the oceans. Only a miniscule amount of water is potable ("Water Conservation"). While that number seems small, that is still 1% of the Earth's Surface. This is still an impressive amount of water. Understanding how much water is available is only the first step. Next we must consider how much humans use.

Humans use a vast sum of water every day. In America, the average citizen consumes 176 gallons of water every day. In Africa, the average citizen consumes 5 gallons of water per day. Every month, America consumes 3.9 trillion gallons of water. ("Water Facts..."). But human consumption isn't the issue in America- or anywhere for that matter. Seventy percent of global freshwater goes toward agriculture. We use trillions of gallons to grow the food we need to survive, while losing the water we need to survive ("...Irrigation & Water Use."). In high-income countries, 30% of freshwater goes toward food industries while over 50% goes toward industry. In more poor countries, a staggering 82% of freshwater goes to agriculture. We can see food production and industry take a vast majority of a nation's freshwater, regardless of what income level the country has. The other factor to consider is the water needed to produce items outside of agriculture and industrial applications. Take paper for example. The amount of water needed to produce a sheet of paper is 2.6 gallons. This is not a huge number by itself. But one must consider how *many* pieces of paper are produced daily. Producing a computer chip takes 8.5 gallons ("Infographic: 10 Things..."). Every single one of the "improvements" humanity has made truly just uses more of an already stressed resource. It doesn't take an engineer or mathematical prodigy to look at these numbers and be concerned. One might ask "Where are we getting these trillions of gallons?" The answer is groundwater, as we have always used since the dawn of mankind.

How close are we to running out of water? Most research says that in less than 50 years, over half of the global population will live in water-stressed areas. The same prediction says that by 2050 1 billion people (13.7% of the global population) will live in areas where local water supply does NOT meet demand. Already, China has taken the largest water relocation project in mankind's history. The government moved an entire city in order to build a massive concrete aqueduct, taking water from the southern regions of China to the northern ("A Canal too Far"). The fact that China is one of the largest countries in the world and it still doesn't have the accessible water to an entire region of the country highlights the struggle many more countries will face in the years to come. This is not some distant apocalyptic scenario or fantasy dystopia. This is our future. This is where we are headed right now. Thirty-four years from this day, over 1 billion people will struggle to find water (Roberts, "Predicting the Future of Global Water Stress."). This is why humanity needs to act now. It is our life and our children's life that will be destroyed if we do not focus on the larger issues. Yes, reduction of our ozone is a problem. Production of oil is an issue, and food production will be an issue. We have already taken steps to preserve our ozone layer. In the mid 1970's, a large hole was discovered forming above Antarctica. The hole in the ozone threatened more skin cancer and cataracts in humans and reproduction issues in many animals. The planet realized what a threat this was and global regulations were passed in the Montreal Accord, the only unanimously passed UN regulation ever. With regulations in place limiting chlorofluorocarbons (CFCs), which were common in aerosol sprays, the hole is well on its way to healing (Handwerk "Whatever Happened...").

Regarding oil concerns, there are a lot of different sources saying how long we have left until the Earth runs out of oil. The shortest projections say we will run out of oil in the next 50 years. Others say we will never run out because as the supply dwindles, prices will rise and we will use less (Moffatt "Will the World Ever Run Out of Oil?"). Either way, we do not need oil to survive. It is a luxury that we take for granted, but not necessary for human survival"). Finally, the idea we will not have enough food in the future is a misconception. As it is right now, we produce enough food for everyone on the planet with no issues. The misconception is that just because countries produce enough food, does not mean everyone has access to it. Food production is not, and will not be, an issue for a long time according to the United Nations Food and Agriculture Organization (Food: "There's lots of it"). Many of humanity's issues are decades or lifetimes away. Humanity will never have to worry about starving or running out of air since we will have died of dehydration decades earlier. We have come so far from where we used to be, so much innovation and improvement. But we have much more to go if humanity is to survive. Now is the time for action.

What can humanity do to save ourselves and our planet? There are infinite options and possibilities that can happen in the future. We discover new compounds or genetic mutations every day, and there is no telling what improvement may give us the knowledge to survive. But we cannot save ourselves on hope. We cannot drink hope. We cannot grow food with the hope of some future discovery. We have the tools we need to survive right now; we just have to use them. The best and only option for our species continued lifestyle is desalination. Desalination is the process of removing the salt from ocean water. Desalinating ocean water is expensive and none too effective, but it is sufficient for what we need. It is possible to create potable water from desalination, but it is the most expensive and power intensive method. Luckily, humanity does not need to turn to desalination for potable water. Instead, the desalinated water will be used for industry and agriculture. As covered before, those two industries use the vast majority of a nation's water. They do not need perfectly clean drinking water to irrigate crops or cool industrial machines. Instead, use the desalinated water. This will leave 70-85% of a nation's water for drinking. There are some factors to consider before turning to desalination. First, all methods require a significant amount of power. Also, one must consider the volume of water that might be needed for industry or agriculture, and how much a desalination plant can produce. To continue, here are the methods of desalinating salt water:

- 1) Vaporizing desalination: water is boiled and the steam is collected, leaving the salt ions behind. This method takes an enormous amount of energy, even if the pressures are changed in the boiling tank to lower the boiling point. This is the main method to produce potable water.
- 2) Electrical desalination: water is run through a thin membrane where an electric current is charged, gathering all the salt ions as the water continues through. This method uses a fair amount of energy, and does not produce potable water.
- 3) Semi-Permeable Membrane: water is pushed through a membrane at high pressure, and the membrane allows the water molecules past, but not the salt ions. This method is most energy efficient but produces the least pure water. Another benefit of this method is that it can produce a lot more water compared to the other methods.

(Parise, "Water Desalination")

The key is to use desalination as water for crops. Crops do not require potable water and desalinated water is the perfect solution. Once we stop using the fresh groundwater to irrigate crops that will take an immense stress off of the natural water supply. This seems like a simple solution, partly because it is, and partly because it doesn't completely fix our issue.

The other aspect of humanity's issue *is* humanity. There is only so much square footage on Earth and only a finite amount of resources. Without using horrible and inhumane population control methods, we cannot stop our expanding population. The best solution we have is to make our planet and current resources suffice until we have gained enough knowledge to take to the stars and procure resources in other fashions. Humans have a tendency to avoid personal responsibility and by turning a blind eye to this very real problem, we are sealing our own doom. We need to take responsibility and realize that we, as individuals, need to change our day-to-day behavior if our race is to survive. If our population continues to grow at its ever increasing rate and we continue using the resources at the same rate, Earth will not be able to support our species. The goal is to improve ourselves enough to leave Earth and procure resources from outside our planet. We will not leave Earth an abused husk, rather we continue living here and living somewhere out in space. By taking away some of the population, it will give Earth the chance to recover. This is a bleak and disheartening realization, knowing that someday in my great-great-great-grandchild's future we will not be on the same planet that I lived on, but it is the necessary step to ensure humanity's survival.

So, is humanity improving? The answer is currently and definitively no. We have better medicine and food production, more efficient engines and faster aircraft, 24 hour television so you can follow the reality drama. But every improvement and step humanity has taken has been a reflection of our culture: surface deep. At first glance most aspects of life are better now than ever before; however, each step brings us closer to our own destruction. There needs to be many more improvements and more knowledge gained if we are to keep our population at the standard it is today. All aspects of our shortcomings can be fixed with the expansion of knowledge. Knowledge in our general population will make people realize we have laid out our destruction based on our cultural value. When we value and idolize clueless celebrities and let media outlets tell us what to feel, we take giant leaps backward. Humanity's knowledge is not a ladder. We do not climb to a certain level and stay there. Our knowledge and improvement is like an ocean's current - ebbing and flowing. We peaked thousands of years ago, when people valued arts and science during the Renaissance. We fade back during the dark ages as disease and famine ravage the population. We flow forward with theories of relativity and an understanding of how our natural world expands and ebb away as culture is no longer interested in innovation and the arts but rather the latest Netflix hit series.

If the United Nations would stand strong and take a stand like it did with the ozone hole, our population might have a chance of fixing the water crisis that looms over us. The United Nations must be a global leader in the coming years, stopping people from turning a blind eye to this issue. I would beg and demand that the UN fund and further develop desalination to save our species. I would implore them to ignore the oil, ignore the ozone and climate change. Those issues are inconveniences right now and deadly only in the next hundred years. The water crisis

is the greatest threat humanity has faced in our history. Yet somehow, no one is familiar with the issues that loom just a few decades from now. The lack of knowledge is what will end us more than anything else. If the UN acted as one governing body over all countries, they would have to demand the use of desalinated water for crop irrigation to preserve the potable water for drinking. But alas-and probably for the best- the world is not run by one entity. Instead we all live in our own little world, making our own way. But one person can make a difference and here is an example.

A man was driving to work one day, cursing as he was late as usual - thanks to rush hour traffic. He finishes his day at the office and drives home, missing a warm dinner with his family thanks again to rush hour traffic. It was only as he is parked on the highway does he realize that **he** was the traffic.

We as individuals need to learn to take personal responsibility. My flush of a toilet or 15-minute shower is all part of why the water is going to run out. My consumption of corn or beef is part of why the water will run out. My ignorance that a water crisis is looming is part of the reason the water will run out. There is something one person can do to make a difference, learn more about the issue and educate others. Next, take small steps in your everyday life. Take shorter showers, do less laundry, use water efficient toilets. Every single ounce of water saved helps in the long run. And if every individual made these small changes, or even appreciated the fact you can turn a nozzle and have fresh water all the time, things would begin improving. As an engineer, I look to myself and my fellow classmates to develop desalination to the point where we could make potable water and never have to worry about running out again. Also as an engineer I can work to develop more efficient desalination plants by engineering new membranes. If we engineer desalination to be more energy efficient, we can then prevent a future energy crisis by being conscientious now. We have made it so far since mankind first stood on the moon, but soon might be our darkest time yet. I have faith that when the need is great enough, we can stand together with synergy, to do what needs to be done and survive.

Works Cited

- "A Canal Too Far." The Economist. The Economist Newspaper, 27 Sept. 2014. Web. 10 July 2016.
<http://www.economist.com/news/china/21620226-worlds-biggest-water-diversion-project-will-do-little-alleviate-water-scarcity-canal-too>
- Binns, Corey. "How Long Can a Person Survive Without Water?" LiveScience. TechMedia Network, 30 Nov. 2012. Web. 01 July 2016.
<http://www.livescience.com/32320-how-long-can-a-person-survive-without-water.html>
- "Food: There's Lots of It." Overpopulation Is a Myth. Wineskin Media, 2010. Web. 07 July 2016.
https://overpopulationisamyth.com/food-theres-lots-it/#Who_says_there_is_enough_food_for_everyone
- Handwerk, Brian. "Whatever Happened to the Ozone Hole?" National Geographic. National Geographic Society, 7 May 2010. Web. 09 July 2016.
<http://news.nationalgeographic.com/news/2010/05/100505-science-environment-ozone-hole-25-years/>
- "How Did The First Humans Live?" Khan Academy. Big History Projects, n.d. Web. 1 July 2016.
<https://www.khanacademy.org/partner-content/big-history-project/early-humans/how-did-first-humans-live/a/foraging>
- "Human Population: Population Growth." Human Population: Population Growth. Population Reference Bureau, n.d. Web. 01 July 2016.
<http://www.prb.org/Publications/Lesson-Plans/HumanPopulation/PopulationGrowth.aspx>
- "Infographic: 10 Things You Should Know About Water - Circle of Blue." Water News. Circle of Blue, 24 July 2009. Web. 09 July 2016.
<http://www.circleofblue.org/2009/world/infographic-ten-things-you-should-know-about-water/>
- Miller-Rushing, Anica, Beth Covitt, Tania Hinojosa, Jose Marcos-Iga, ect. "Earth's Freshwater." National Geographic Society. National Geographic, 12 Nov. 2012. Web. 01 July 2016.
<http://nationalgeographic.org/media/earths-fresh-water/>
- Moffatt, Mike. "Will the World Ever Run Out of Oil?" About.com Education. About Education, n.d. Web. 09 July 2016.
http://economics.about.com/cs/macroeconomics/a/run_out_of_oil_2.htm
- Parise, Tom. "Water Desalination." Water Desalination. Stanford University, 16 Dec. 2012. Web. 01 July 2016.
<http://large.stanford.edu/courses/2011/ph240/parise2/>

- Roberts, Alli Gold. "Predicting the Future of Global Water Stress." MIT News. Massachusetts Institute of Technology, 9 Jan. 2014. Web. 01 July 2016.
<http://news.mit.edu/2014/predicting-the-future-of-global-water-stress>
- Schram, Wilke D. "Questions and Answers on Roman Aqueducts: Purpose." Questions and Answers on Roman Aqueducts: Purpose. N.p., May 2016. Web. 01 July 2016.
<http://www.romanaqueducts.info/q&a/1purpose.htm>
- "U.S. and World Population Clock Tell Us What You Think." Population Clock. United States Census Bureau, n.d. Web. 01 July 2016.
<http://www.census.gov/popclock/>
- "USDA ERS - Irrigation & Water Use." *Usda.gov*. United States Department of Agriculture, 15 June 2015. Web. 01 July 2016.
<http://www.ers.usda.gov/topics/farm-practices-management/irrigation-water-use.aspx>
- "Water Conservation: The Clear Choice | Kendall Jackson Blog." KendallJackson Blog. Kendall Jackson, 14 Apr. 2011. Web. 09 July 2016.
<http://blog.kj.com/water-conservation-the-clear-choice/>
- "Water Facts | The Water Information Program." Water Facts | The Water Information Program. Southwestern Water Conservation District, n.d. Web. 01 July 2016.
<http://www.waterinfo.org/resources/water-facts>