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Is desalination the solution for water scarcity?

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According to the International Desalination Association (2013), “desalination is the process of removing dissolved salts from water, thus producing fresh water from seawater or brackish water.” The International Desalination Association is the only worldwide association that solely focuses on desalination. Their staff includes scientists, engineers, financiers, developers, and researchers, while they state “[IDA] is also committed to informing the public about desalination and water reuse, and their critical role in providing new, reliable and sustainable sources of fresh water around the world.”(IDA,2013) However, they do express a clear partisan view toward the environment.

Desalination is ultimately not the solution to water scarcity because it harms marine life, releases dangerous emissions, and is too costly, while some experts may argue that desalination may be considered a solution to water scarcity because it becoming cheaper to produce, and there is an abundance of seawater.

First and foremost, desalination harms marine life. For example, the filtration used to collect water from the sea does not just collect water; it collects fish and other marine life as well. According to Bettina Boxall (2013) “...the staff estimates that [filtration] would annually suck in more than 80 million fish larvae, eggs and invertebrates along 100 miles of the Southern California coast, including a number of Marine Protected Areas.” Boxall has been a journalist since 1987 and works for the LA Times specializing in water issues; she has also won the 2009 Pulitzer Prize for reporting, although she does have a personal interest in reporting for profit. With this projected loss of fish larvae and eggs, a drop in ecosystem health can be expected. Moreover, endangered marine life may eventually become extinct due to lower populations. This can be potentially catastrophic to our food chain in the long run. Also, the economics of a community may suffer if it is a fishing dependent culture. A loss in fish could be devastating to a small, local economy that relies on exporting goods like fish.

Another example of desalination harming marine life is waste production. After desalination, when the fresh water has been removed, plants are left with a salty brine-water with nowhere to put it. According to the Nick Ashbolt (2008),

The brine generated as a wastewater during desalination is heavier than seawater, so if incorrectly discharged to the ocean would sink to the bottom. In addition, the brine is devoid of dissolved oxygen as a result of the desalination process. If it is released

into calm water it can sink to the bottom as a plume of salty water that can kill organisms on the sea bed from a lack of oxygen.

Nick Ashbolt is a graduate of the University of New South Wales, is Head of School of Civil and Environmental Engineering, and has 25 years' experience in water microbiology and risk assessment, although the source is slightly outdated. Brine production is an extreme problem that desalination plants must focus on, because again, it harms marine life. When these desalination plants conceive excessive amounts of brine, they often just pump it right back into the ocean. The lack of oxygen present in the brine, which effects the oxygen level of the sea. This is the ideal setting for algal blooms, which can kill entire environments through oxygen and sunlight loss. The ocean-brine mixture also effects the fish population greatly because either the fish will die, or they will evacuate the area. This, in the long run, can disrupt the entire environment.

Furthermore, desalination should not be considered a solution for water scarcity because it releases harmful emissions through the process of energy consumption. According to Food and Water Watch (2012),

The energy required to operate these [desalination] pumps typically requires the burning of fossil fuels, meaning the process is also a contributor to greenhouse emissions...

Although Food and Water Watch states directly for the advocacy of the government's responsibility for water quality, which may slant their view, they are a non-profit organization that has campaigned with the UN to recognize water as a human right and has had international viewpoints since 2005. Because of the current global warming and climate change crisis, having another source of greenhouse emissions may be detrimental to the Earth and its inhabitants. Eliminating desalination plants as a solution for water scarcity can enormously benefit the environment.

It may also be beneficial to examine the problem in places such as China, where they have a high need for water due to large population as well as having severe pollution problems, desalination plants could be a blessing and a curse. In China, according to Dominique Mosbergen, a writer for the Huffington Post, "Air pollution is killing about 4,400 people in China every single day..." (2015) Mosbergen, a graduate from Columbia University, is a senior journalist for the Huffington post and has worked as a journalist in India, Russia and the United states, although she openly states her personal interest in advocating for the well being of the environment. With a death toll as high as this without

any desalination factories, it may be a sensible precaution not to consider desalination as a solution to their water scarcity.

Moreover, desalination is not a practical solution to water scarcity because it is far too costly. According to Al-Suhaimy (2013),

Saudi Arabia spends around SAR 135 billion (about USD 36 billion) in annual subsidies to three sectors: water, electricity, and gasoline, at a time when Turki Al Haqeel estimates the needed investment in desalination projects at around SAR 200 billion (over USD 53 billion) to meet the increase in demand for water through the middle of the next decade.

Although it is difficult to find the amount of expertise this author has on the subject area of desalination, the website it came from, Asharq Al-Awsat, is a well-known Middle Eastern news source located in London with the largest circulation of articles of all off-shore newspapers. With a combined price spent on all utilities, including water, totaling about thirty-six billion dollars. (Al-Suhaimy, 2013) Desalination is expected to cost fifty-three billion dollars, which is more expensive than all of their utilities combined, so, clearly, it is an unnecessary expense that would put a strain on the country's resources. (Al-Suhaimy, 2013) Also,

[Desalination] provide[s] 20 percent of the water consumed by the country's households. Built for the Israeli government by Israel Desalination Enterprises, or IDE Technologies, at a cost of around \$500 million...(Talbot, 2015)

Even though David Talbot has been known for not holding back his opinion, he is accountable because he is the founder and former CEO of Salon.com, and is currently the editor and chief correspondent for the MIT Technology Review. Talbot also worked as senior editor for Mother Jones Magazine and a features editor for The San Francisco Examiner, while his experience includes work for Time magazine, The New Yorker, Rolling Stone and other publications. This quote by Talbot explains that even though the desalination will provide only twenty percent of water, it will still cost millions of dollars to the Israeli government. This outshines the fact that a new refutable source of water is available.

On the other hand, it can be seen that desalination is a solution for water scarcity because it is becoming cheaper to produce. Shown in another quote by David Talbot, (2015)

However, Sorek will profitably sell water to the Israeli water authority for 58 U.S. cents per cubic meter (1,000 liters, or about what one person in Israel uses per week), which is a lower price than today's conventional desalination plants can manage.

So, it is clear that at fifty-eight cents per week, desalination can be beneficial at a small price. Even though desalination plants cost billions of dollars to build, the actual product is relatively cheap. Also, according to Bryan Walsh (2014)

The plant [Carlsbad, CA] will use IDE's reverse osmosis technology, which requires less energy...It is part of a plan to have 7 percent of the region's water supply come from desalinated sea water...

Bryan Walsh is the Foreign Editor at Time Magazine and specializes in environmental issues, writing the Going Green column and contributing to their environmental issues blog, and graduated from Princeton University, although he only recently became interested and involved with environmental issues. His quote is stating that the reverse osmosis technology that will be used in the Carlsbad plant located in California will be optimized to use less energy than ever. Less energy used can imply that it will be cheaper to operate because a minimal amount of energy will be consumed.

It is also evident that desalination is a possible solution to water scarcity because it is a quick, obtainable fix for thirsty regions. According to Edward Wong (2014),

The plan is to complete construction of the plant by 2019 and for it to supply one million tons of fresh water each day, which could account for one-third of the water consumption of Beijing, a city of more than 22 million people, officials said.

Edward Wong specializes in everything from politics to environmental issues for the New York Times in Beijing and has a Master's degree in journalism, although his area of expertise may be too large to fully investigate the issues of desalination. Wong was also the Times' main correspondent on the Iraq war and received the Livingston Award for International Reporting in 2005 along with being nominated for the 2009 Pulitzer Prize in International Reporting. His quote explains that Beijing's water crisis could possibly be solved within 5 years of this article. Wong (2014) also states

In 2011, that plant — the Beijing Power and Desalination Plant — was one of two in Tianjin and supplied a suburb with 10,000 tons of desalted water daily. It plans to expand the amount pumped daily to 180,000 tons...

This is emphasizing that along with immediately supplying the city of Beijing with a third of their water needs, they intend to gradually increase the amount of water produced. (Wong, 2014) This water may possibly go on to supply other cities or even supply Beijing with one hundred percent of their water needs. This would demonstrate that desalination is a reliable solution for water scarcity.

With this research, I found the most useful sources to be from American originated sources with foreign based authors or branches. David Talbot proved to be the resource that would be most interesting, arguing both sides in his works, which also added to the convenience of his articles in my research. It was most surprising to me in my research that I found most desalination plants would only cover a small fraction of an area's water needs. Surely, I thought, the desalination advocates did not realize how minimal an impact they were making. But, when I saw that that was still almost ten percent of the population of a large city's water usage, I figured it must be useful. So, I decided desalination plants may be somewhat useful, but not in an overall sense. In the future, if desalination was developed more thoroughly and made to be more environmentally and cost friendly, then the world's water issues could possibly be resolved for good.

In conclusion, because desalination is currently too costly and harms the environment in the sense that it is hazardous to the atmosphere and marine life, it should not be considered a solution to water scarcity, even though some experts argue that it is becoming cheaper to produce and is a readily available, relatively quick option for those in desperate need of water.

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