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Annotated Bibliography

Ausubel, Kenny. *Restoring the Earth: Visionary Solutions From the Bioneers*. Tiburon, CA: H J Kramer, 1997. Print.

Kenny Ausubel's book, *Restoring the Earth: Visionary Solutions From the Bioneers*, describes various biology-influenced solutions to many of the critical environmental problems facing us today, including water waste and pollution discussed in the chapter called "Cleopatra's Bathwater." He explains that the Earth's water supply is a "finite, closed-loop system" and that the cheapest and fastest way to allow this system heal itself is to immediately stop "massive dumping of toxic chemicals and sewage." Pollution prevention will "cause a great surge in positive ecological health" and will save more money than if the pollution persisted but was continuously cleaned up, claims Ausubel. He also believes that a key to eliminating water issues is to raise its price to "reflect its true value" which encourages more efficient use in large-scale industry and agriculture as well as in small-scale city and home use. Ausubel also promotes city-mandates of water-saving household appliances as well as "xeriscaping (dry landscaping) and discouraging water-consumptive lawns and golf courses." These are just some of Ausubel's practical solutions which conclude that as long as we truly understand and respect the value of our water we can avoid the imminent water crisis– by "learning from natural systems and emulating them cleverly" rather than treating water as "hardly more than an industrial 'resource' and noxious dumping ground."

This chapter is very informative about water's biological significance and also its widespread misuse. There are many examples of specific problems in our water supply, and why they happen, as well as large- and small-scale solutions. This would be a very good chapter to use in the final project.

Cowan, Kenneth. "Harvesting Rain." *Ecologist (London, England) Vol. 38, No. 5*. Jun 2008: 40-43. *SIRS Issues Researcher.* Web. 26 Oct 2011.

Kenneth Cowan's article, "Harvesting Rain," discusses the ancient practice of harvesting and storing rainwater and how this relatively simple technology can be adapted for personal or community benefit. He explains that ancient and modern peoples of the Middle East depend heavily on harvested rainwater. Ancient systems, some still in use, include large interconnected storage cisterns and underground channels. According to Cowan, such systems supplied enough water for "20,000 hectares... [T]he agricultural produce of this system could have sustained around 300,000 people." He describes an experimental project in the Negev Desert ran by Professor Michael Evenari which used ancient systems to grow grain, vegetable and tree crops, and believes this experiment proved "that these old water systems can be utilized to harvest rainfall for productive human use." Cowan suggests that this ancient

technology can also be adapted for small-scale use at home. Stored rainwater from rain gutters can be used in yards, toilets and washing machines. Although expensive initially, Cowan believes such storage systems could "save money in the long run, with a payback of 10 to 15 years." He concludes that ancient water harvesting and storage techniques can "provide practical design ideas" for supplemental or primary water sources.

This article has a unique historical perspective and many of its ideas are very practical. Although it is a good article for the final project, it isn't the best choice as its solutions are more focused on one single method while the other sources offer more varied ideas.

Holland, Lorien. "Running Dry." *Far Eastern Economic Review.* Feb.3 2000: 18-20. *SIRS Issues Researcher.* Web. 15 Nov 2011.

Lorien Holland's article, "Running Dry," discusses the water scarcity problems facing China and India and how they can deal with water sources which are "under pressure from explosive population growth and rapid industrialization." Holland believes that the first step is to raise the price of water to encourage conservation. He claims that this will be the most difficult task because "while the best way to raise efficiency is to raise water fees or charge for water where it is free, that is the equivalent of raising gasoline prices in the United States, and it's not an easy [political] issue to deal with." Holland also describes the competition for water between rural agricultural applications and more prosperous industrial uses and believes that needs to be regulated more evenly. Although these countries do face food shortages caused by droughts, Holland believes that balancing water consumption will be difficult because "1,000 tonnes of water can produce a tonne of wheat with a market value of $200. In the industrial sector, the same amount of water produces around 70 times more revenue." Another of his solutions is to spread knowledge and will to practice conservation techniques such as tank storage and fixing leaky pipes. "In some cities," Holland says, "basic infrastructure such as water and sewage pipes hasn't been upgraded for over a generation." Holland concludes that many people are optimistic about these solutions since "the systems are failing. There is no other choice" but to continue to forge ahead: as long as "you have the money, the technology and the systems, you can cope."

This article is useful because it describes areas which are currently dealing with water scarcity. It is a good article for the final project because its ideas and solutions can be emulated.

Rogers, Peter. "Facing the Freshwater Crisis." *Scientific American Vol. 300, No. 1.* Aug 2008: 46-53. *SIRS Issues Researcher.* Web. 15 Nov 2011.

Peter Rogers' article, "Facing the Freshwater Crisis," describes remedies for our diminishing freshwater supplies which focus on conservation. His solutions require "the international community... [to] simply accelerate the adoption of existing technologies to conserve and enhance the water supply" by "conserving water, maintaining and replacing infrastructure, and constructing sanitation systems." Rogers' first suggestion is to raise the price of water since "few people take the time to conserve a commodity that seems almost free– no matter how valuable." An innovative idea of Rogers' is to ship "virtual water"– trading water-consumptive crops from wet countries for goods or money from arid countries. This "means that the inhabitants will not have to expend water on [crops like] wheat, which eases pressure on local supplies." Another of his solutions involves large-scale agricultural conservation which is possible by fixing outdated or leaky irrigation systems and storing water underground instead of in dams. Rogers claims that conservation in agriculture is essential; "a 10 percent drop in irrigation water [use] would save more than is evaporated off by all other consumers."

Rogers concludes that, as long as we act as an “international community” and cooperate for the benefit of all, surviving a global water crisis is possible: “the part of the globe that is most likely to continue suffering from inadequate water access– Africa and its one billion inhabitants– spends the least amount of money on water infrastructure and cannot afford to spend much; it is crucial, therefore, that wealthier nations provide more funds to assist the effort.”

This article is very informative about water's significance and issues from a global perspective. The author uses his engineering and city-planning background to provide practical and specific solutions. This would be a great article to use in the final project.

Sher, Hanan. "Source of Peace?" *Jerusalem Report*. 13 Mar 2000: 34-39. *SIRS Issues Researcher.* Web. 21 Nov 2011.

The article, “Source of Peace?” by Hanan Sher, describes the conflicts caused in the middle east regarding water shortages and provides both currently-used and proposed solutions to these shortages. Sher quotes Jordan's King Abdullah's warning: “Future potential conflict in our area is not over land, it's over water.” His main solution is to fully utilize current and proposed seawater desalination plants– preferably trading the older “energy-guzzling 'thermal' processes similar to distillation” (which spend $1.80 to desalinate one cubic centimeter of water) for the newer reverse osmosis processing plants (which spend 55 cents to desalinate the same amount of water.) Another much more costly solution is known in the Middle East as the “Peace Pipeline.” This pipeline's branches would run from Turkey's several rivers (including the Euphrates, Tigris, Ceyhan and Seyhan) “about 1,500 km. eastward to Iraq, and potentially to Kuwait... 1,500 km. southward, through Syria, to the Jordan valley... reaching its terminus in Saudi Arabia” with another possible branch bringing "water directly to Israelis and Palestinians,” describes Sher. Over the years, Sher explains, Turkey has become less eager for this plan because of its own increasing water needs although their need for money for development of certain poverty-stricken areas may soon override this hesitation. He offers another idea which could save water without much sacrifice or cost: “switch away from water-intensive crops like cotton, avocados and oranges – much of which are produced... for the export market.” Sher is optimistic that, with trust and reciprocity on all sides, the Middle East can work together to overcome their water problems and avoid any future water-wars, but that may not be possible given the current political climate in those areas. He concludes that “if money is a major obstacle to the various potential regional water solutions, the current attitudes of some of the major parties to each other is a bigger one.”

This article is relevant because it describes countries which are currently dealing with water scarcity and water-wars. It is a good article for the final project and its ideas and solutions can be emulated, although it is extremely specific to one area and its ideas revolve around specific rivers and political climates.

Issue Summary

The article, “Source of Peace?” by Hanan Sher, describes the conflicts caused in the middle east regarding water shortages and provides both currently-used and proposed solutions to these shortages. His main solution is to utilize desalination plants to “produce the cheapest desalinated water yet, through a process known as 'reverse osmosis'...finally [making] desalinated water competitive.” In “Facing the Freshwater Crisis,” Peter Rogers advocates the use of the “membrane reverse-osmosis systems” in newer desalination plants as he believes that “beyond constraining demand for freshwater, the opposite approach, increasing its supply, will be a critical component of the solution to water shortages.” Although relatively energy-inefficient and expensive now, the technology for such plants is growing steadily which increases efficiency while lowering costs. Rogers explains that “scientists are now working on reverse-osmosis filters of carbon nanotubes that offer better separation efficiencies and the potential of lowering desalination costs by an additional 30 percent.”

In discussing the threats of water-wars facing Middle East, Sher wonders, “will water be a catalyst for regional cooperation and peace, or a trigger for war?” He quotes MIT economist Franklin Fisher: “The cost of a day's fighting in a Middle East war is at least $100 million. The bill for a week would be sufficient to build four 50-cubic-metres-a-year desalination plants – leaving, hopefully, nothing to fight over.” In *Restoring the Earth: Visionary Solutions From the Bioneers,* Kenny Ausubel points out that, since “40 percent of the world's population lives in river basins shared by more than one nation,” this tension between countries over water supply is not going away unless addressed soon. Water-rights conflicts can even affect those in the same country. Plans for the construction of new dams in Eastern India, which will bring freshwater to areas across Western India, have been “attacked by protestors concerned about the rehabilitation of displaced villagers,” according to Lorien Holland's article, “Running Dry.”

Kenneth Cowan's article, "Harvesting Rain," discusses the ancient practice of harvesting and storing rainwater and how this relatively simple technology can be adapted for personal or community benefit. He believes these rainwater-storage cisterns "could hold vast amounts of clean water with little evaporation." In the article, "Facing the Freshwater Crisis," Peter Rogers agrees because "rainfall and snow accumulation – and runoff to rivers – peak during the non-growing seasons...when demand for irrigation water is lowest." Rogers' solution is to utilize "large subsurface reservoirs…that can easily return their contents aboveground when needed for irrigation." In his book, *Restoring the Earth: Visionary Solutions From the Bioneers,* Kenny Ausubel advocates "smaller scale technologies such as microdams, low-tech solar pumps and shallow wells."

Cowan also believes that harvesting rainfall can help prevent water from becoming "a commodity – available only to those who can pay" because he believes it will lead to more water shortages for the poor. Every other author believes that raising water prices is good and that it will encourage conservation. In "Facing the Freshwater Crisis," Peter Rogers states that "[p]eople in the American West have an old saying: 'Water usually runs downhill, but it always runs uphill to money.'" He acknowledges unfair water access based on wealth but he still believes that raising price is necessary to prevent water-waste because "few worry about waste if a commodity is so cheap that it seems almost free." In the article, "Running Dry," Lorien Holland promotes raising prices, but acknowledges the political pressure against it; a sudden raise in water prices "is the equivalent of raising gasoline prices in the United States, and it's not an easy issue to deal with." Holland adds that it is estimated "that Indian customers pay between 2 and 4 rupees per cubic metre...even though supplying this amount costs about 10 times that sum."

Peter Rogers' article, "Facing the Freshwater Crisis," describes remedies for our diminishing freshwater supplies which focus on conservation. Rogers discusses the waste that is caused by underfunded and leaky water-infrastructure systems. He believes that "one of the major consequences

of pricing water too low is insufficient funds are generated for future development and preventive upkeep... Rather than avoiding major failures by detecting leaks early on, they usually wait until water mains break before fixing them." In "Running Dry," Lorien Holland agrees; "leaky water pipes and theft mean that up to half the water can be lost between the treatment plant and the home. In some [Indian] cities, basic infrastructure such as water and sewage pipes hasn't been upgraded in generations." Hanan Sher's "A Source of Peace?" explains that "leaky pipes are said to cost Damascus a staggering 30 percent of its water; in Amman and Gaza, the loss has been estimated as high as an unthinkable 60 percent."

Rogers also advocates saving water in more arid regions by trading for water-consumptive crops and goods from water-rich areas. He explains that the "provision of goods – and the virtual-water content of those goods – is helping many dry countries avoid using their own water supplies for growing crops, thus freeing up large quantities for other applications." In his article, "Source of Peace?" Hanan Sher supports this idea and believes that arid places should "switch away from water-intensive crops like cotton, avocados and oranges – much of which are produced, using government subsidized water, for the export market."

Lorien Holland's article, "Running Dry," discusses the water scarcity problems facing China and India and how they can deal with water sources which are "under pressure from explosive population growth and rapid industrialization." Holland explains that in China, the need for water use in both agricultural and industrial sectors is very competitive since "1,000 tonnes of water can produce a tonne of wheat with a market value of $200. In the industrial sector, the same amount of water produces around 70 times more revenue." In the book, *Restoring the Earth: Visionary Solutions From the Bioneers,* Kenny Ausubel describes that not only do industrial sectors consume a large amount of water, they also pollute almost as much as agriculture. "California's Silicon Valley contains the largest

concentration of waste cleanup sites in the U.S....[and] much of Santa Clara County's groundwater is contaminated with trichlorethylene (TCE) and other toxic compounds used by the computer industry."

Holland also discusses the loss of crops caused by droughts or when water is diverted to other uses. "[E]conomic losses caused by water shortages in cities across the North China Plain ran as high as 200 billion renmibi ($24 billion) in 1997...Some 20 million tonnes of grain are also lost because there is not enough water for irrigation." Hanan Sher explains that this situation is growing across the world; "Egypt's rising food imports reflect its water crisis, although the government hasn't dared acknowledge to its citizens that, after 6,000 years, the Nile is no longer capable of meeting their needs." In "Harvesting Rain," Kenneth Cowan warns of imminent water shortages when he says "as population grows, water-consumption doubles every 20 years."

Kenny Ausubel's book, *Restoring the Earth: Visionary Solutions From the Bioneers*, describes various biology-influenced solutions to many of the critical environmental problems facing us today, including agricultural water waste and pollution discussed in his chapter "Cleopatra's Bathwater." Ausubel is concerned about environmental aspects of water use, and explains that the "damming and diverting of nearly every major watercourse on Earth has, along with pollution, had such a destructive effect on wetlands, lakes, watersheds, and all riparian habitats that freshwater aquatic species are the most threatened form of life on the planet." Along with pollution and destruction of habitats, evaporation is another major reason many are against large dams. Kenneth Cowan, in "Harvesting Rain," states that "[y]early evaporation on the Aswam dam, in Egypt, is measured in cubic kilometres."

While focusing on agricultural water waste and pollution, Ausubel states that "[p]oorly conceived irrigation projects and meat-centered agriculture are the main culprits...dumping millions of tons of animal wastes, nitrates and phosphates from fertilizers, pesticides, herbicides, and fungicides into our water."In his article, "Harvesting Rain," Kenneth Cowan promotes ancient rainwater-storage systems as an example to emulate; "agricultural produce of this system could have sustained around

300,000 people.” Peter Rogers' suggested solution is to “conserve irrigation flows [to] conserve dramatically more freshwater.” He wants to see efficiency improve by using “more efficient application of water to farm crops,” such as implementing drip-irrigation and lining canals with waterproof materials.

Source Analysis

An important solution to water shortages in Kenny Ausubel's book, “Restoring the Earth: Visionary Solutions From the Bioneers,” involves raising the price of water. Ausubel believes that “pricing water to reflect its true value encourages better use, a trend now emerging in European industry.” He states that “proven methods” can be used which can save 30 to 90 percent of water currently used in “wasteful agricultural irrigation,” which appeals to logos. By using words such as wasteful and reform to describe current large-scale water-use, Ausubel appeals to pathos by channeling peoples' frustration and need for correction towards these large-scale water users. Ausubel appeals to the ethos of people who value ecology and environment over saving money – their own money or that of corporations. This is a very convincing argument because Ausubel says that these corporations use a large amount of water as if it had no actual value. He also makes the argument seem appealing by mentioning that it is beginning to be used in other parts of the world.

Ausubel's second solution requires ending ecological damage and water waste by “curtailing massive dam and irrigation projects” by adopting low-tech solutions such as microdams and shallow wells. Ausubel believes that “wherever these simple technologies are applied, almost instantaneous results are visible.” Since this statement is vague and not supported by facts in the article, it only attempts to appeal to logos. The ethos and pathos are used when Ausubel mentions overfishing and over-development – appealing to those who are afraid of pollution and waste and believe that current methods are bigger than necessary and that simpler solutions exist. Ausubel is very convincing because of his specific examples of the simple technology which exists and could be used.

Kenneth Cowan's article, “Harvesting Rain,” tries to convince people that personal and community-scale water use can be supplemented by rainwater harvesting. Cowan's main argument regards the effectiveness of using at-home “water-butts” to collect rainwater from roofs. He states that “the average British roof collects 85,00 litres of rainwater a year, enough to fill 450 water-butts.” Logos

leads one to believe that this is very possible in a place with a climate similar to England's although other climates, such as the American West, would have very different amounts. People living in arid regions also seem to have the instinctive ethos that harvesting water results in downstream shortages which leads their pathos to consider whether storing large amounts of rainwater is fair to those downriver (or legal.) This argument is very relevant to people who are looking for and could afford home-scale supplemental water use to save money or raise their level of self-sufficiency.

Cowan also argues that large corporations need to stop buying up springs, reservoirs and aquifers for bottling because when this is done, “local people often lose their rights of access to local water.” Cowan's argument is not supported by sources or data and therefore does not appeal to logos, although most people would believe it anyway because many bottled water companies claim their water comes from springs. This also appeals to the ethos of people who are ethically opposed to bottled water. Pathos is used because many people believe that large corporations take advantage of poor and disadvantaged rural or native peoples. This argument is effective because it appeals to many people's belief that clean water is one of many basic human rights.

Peter Rogers' article, “Facing the Freshwater Crisis,” discusses some of the “political, economic and technological measures that can ensure water security now and in the upcoming decades.” Rogers' first suggestion is to raise the price of water since “few people take the time to conserve a commodity that seems almost free– no matter how valuable.” This argument is valid because it is easy to see that if people (and companies) want to save money they will need to save water if it costs more. Rogers appeals to logos by stating that “a 10 percent drop in irrigation water [use] would save more than is evaporated off by all other consumers.” This leads one to conclude that fixing leaks and inefficiency (unnecessary evaporation) in agriculture will prevent water waste. Many peoples' ethos involves the belief that corporations will do anything as long as it saves them money.

Another idea of Rogers' is to ship “virtual water”– trading water-consumptive crops from wet countries for goods, arid-thriving crops or money from arid countries. This “means that the inhabitants will not have to expend water on [crops like] wheat, which eases pressure on local supplies” of water. This argument of Rogers' appeals to logos in that it is very easy to see its logic and the reasons that it would work theoretically. Rogers' idea also appeals to pathos by discussing fairness, mutually-beneficial trade and cooperation between countries (although this may not be realistic in certain cases) which also appeals to a democratically-influenced ethos. Rogers' solution is very convincing in theory and it could be simple to carry out once politically and economically supported.

Lorien Holland's article, “Running Dry,” discusses the water scarcity problems facing China and India and how they can deal with water sources which are “under pressure from explosive population growth and rapid industrialization. ” Holland believes that the first step is to raise the price of water to encourage conservation. He claims that this will be the most difficult task because “while the best way to raise efficiency is to raise water fees or charge for water where it is free, that is the equivalent of raising gasoline prices in the United States, and it's not an easy [political] issue to deal with.” The admission of political difficulty appeals to ethos by describing the possible troubles of his idea. Holland affects the pathos of his western audience by comparing raising water prices of China and India to raising the gasoline prices in America. Comparing it to something that has happened here in this country is what makes the argument so convincing and also brings about the conclusion that gasoline is harder to waste because of its high price.

Holland also describes the competition for water between rural agricultural applications and more prosperous industrial uses and believes that needs to be regulated more evenly. Although these countries do face food shortages caused by droughts, Holland believes that balancing water consumption will be difficult because “1,000 tonnes of water can produce a tonne of wheat with a market value of $200. In the industrial sector, the same amount of water produces around 70 times

more revenue.” This argument appeals to logos because of its data. Pathos is appealed to because Holland mentions the frightening idea that these areas still suffer food shortages and will definitely need to import food if their water is being used in other areas. Ethos is appealed to because Holland mentions that using water for industry pollutes the water and the areas around the industry more than it would if used in agriculture. This solution is convincing because similar things are currently happening in America.

Hanan Sher's article called “Source of Peace?” explains current and future water shortages in the Middle East for a Middle Eastern audience. His main solution is to fully utilize current and proposed seawater desalination plants– preferably trading the older “energy-guzzling 'thermal' processes similar to distillation” (which spend $1.80 to desalinate one cubic centimeter of water) for the newer reverse osmosis processing plants (which spend 55 cents to desalinate the same amount of water.) Sher's cost facts appeal to logos because it is easy to compare which solution is more cost-effective over time. Sher appeals to the ethos of those who believe that the large up-front cost and energy use of a desalination plant is worth it in the end. He also appeals to pathos by saying that new technology makes desalination more feasible than when older, energy-wasting plants are used. Even though it is very expensive, this is a very convincing solution (even if the older techniques are used) because of the seemingly endless supplies of salt water, especially considering the Middle East's large coastal areas.

Another solution is known as the “Peace Pipeline” and, although it is much more costly than even expensive desalination plants, seems simple at first glance. This pipeline's branches would run from Turkey's several rivers (including the Euphrates, Tigris, Ceyhan and Seyhan) “about 1,500 km. eastward to Iraq, and potentially to Kuwait... 1,500 km. southward, through Syria, to the Jordan valley... reaching its terminus in Saudi Arabia” with another possible branch bringing "water directly to

Israelis and Palestinians," describes Sher. The difficulty in this plan lies in the political and cost obstacles. He appeals to pathos by mentioning that Turkey has a need for money for development of its large poverty-stricken areas which may soon override any politically-inspired hesitation toward the pipeline. Sher appeals to the pathos of those who believe that the Middle East can and will put aside their difficulties and work together for the greater good. He appeals to the ethos of those who believe that it is wasteful to allow the water from these rivers to simply flow to the sea and become useless to humans. This solution is convincing although it would be politically and financially difficult and also because building it would take a large amount of materials and continuous maintenance.

Works Cited

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Blog

While looking for subjects for the final project, I picked one that I didn't know much about because I felt that learning about it would keep my interest for such a long project. After reading about water conservation and discussing it with friends, I realized that we in the American West (especially my friends from St. George) have had a subconscious understanding of water shortages and the effects of water on the environment. At the same time, it seems that living in an arid area would make people a lot more conscious of water conservation than they are. The amount of grass lawns, golf courses and palm trees in St. George and Las Vegas is shocking to me. The damming of rivers, such as the Colorado which flows through Mexico, seems very unfair to me especially since that water isn't used for crops and Mexico could definitely use it. My friend who is studying Geography and Environmental Science has always had what I used to think was a very over-exaggerated negative view about our current misuse of natural resources. Reading some of the facts about how close the Earth really is to water crisis was very surprising to me, but at the same time the solutions that were offered by the authors were comforting as they seemed very achievable as long as people were aware of the scope of trouble that we are in.

Kenny Ausubel's book, *Restoring the Earth: Visionary Solutions From the Bioneers,* was very environmentally-focused and I very much enjoyed learning about water-scarcity from a scientific and environmental angle. He explains water's unique and essential role caused by its molecular traits; its "specific heat, heat of vaporization, and heat of fusion give life its ability to maintain itself in hard times" - this stability helps with things such as preventing quick freezing of the Earth during winter and an keeping organism's homeostasis. He strongly advocates efficiency in agriculture, such as adopting smaller scale dams and irrigation, and preventing pollution and the destruction of habitats. He offers an ethical environmental motivation for water conservation and cleanliness which would benefit the health of *all* of Earth's organisms.

I really enjoyed the historical perspective and detailed descriptions of ancient water systems in Kenneth Cowan's article, “Harvesting Rain.” He believes that “the methodologies behind ancient hydrological systems could be used to provide sustainable water resources to large numbers of people in...quite arid areas.” It is a unique concept to consider dams as a heroic, modern-day fad while seeing historical methods as being more practical. The newer dams use high-tech methods which change the environment drastically and have large amounts of storage (and waste) while these older methods use low-tech, unobtrusive methods by necessity. Since the ancient people couldn't afford the waste from evaporation there was a lot done to prevent it.

Lorien Holland's article, “Running Dry,” discusses the fast-growing population and industries of China and India and how they are dealing with water-conservation – an article with a great perspective on global water problems and solutions. He describes a strategy regarding price-raises; for “[f]ear of social instability if water prices are raised too sharply, local governments have been slowly edging up prices since the late 1990s.” He explains India's water problems to be mostly due to waste and political mismanagement instead of actual water scarcity, since their infrastructure is wasting a huge amount of water through leaks, evaporation and theft. He describes China's problem as being due to water waste as well as industries instead of for agriculture. This was interesting to me because of the details, including that some of China's rivers have run dry for 200+ days at a time because they were rerouted for use in industry.

Hanan Sher's article, “Source of Peace?” discusses that if the Middle East worked together and traded their resources freely, they could overcome and balance water scarcity. I enjoyed this article because of how politics can ruin something as simple as, for example, trading water for oil or arid crops for wet crops. Desalination plants would be the main part of his solution. I think these are a huge answer and that the technology to increase their efficiency will be around soon and could be powered by sun, wind or the water going through the pipes to generate electricity. He acknowledges it is an

expensive an energy-inefficient concept, but says that “[w]hen there are no practical short-term solutions, it appears, an impractical one is the only alternative.”

Peter Rogers' article, “Facing the Freshwater Crisis,” focuses on ways to conserve water by fixing leaky infrastructure and using gray water. As he says, “We do not have to invent new technologies; we must simply accelerate the adoption of existing techniques to conserve and enhance water supply.” This was my favorite concept of the articles because it seems that the main thing that needs to change is peoples' willingness to conserve and spend money doing so.

I believe that we can solve these water-crises by being willing to conserve water. Raising water's price would encourage conservation. If desalination is used, the price of desalinated water could be combined with the price of mains water to balance out the price so that it isn't too expensive for people to live. Fixing leaky infrastructure will be a way to save a large amount of water as well as utilizing gray water/collected rain and water-saving appliances. Basically, I see the solution to be a combination of most of the authors' solutions, as long as we have the will and methods to work together by assisting countries who cannot afford water plants and by trading with countries that need water-rich crops.