People and Water: Finding the Balance

Shivang Desai

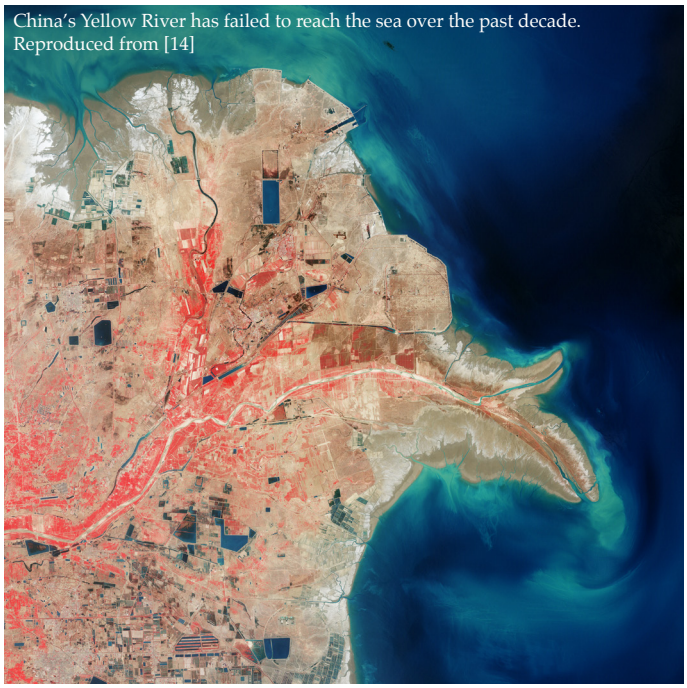
The struggle to reduce population growth began in the mid-20th century when experts, worried by the predictions of Thomas Malthus, began to warn others of overpopulation at a time when the world supported around 2.5 billion people [1]. Now, over half a century later, with a global population of around 6.7 billion people and a growth rate of 1.16 percent, not markedly different from the 1.32 percent of 1961, the movement doesn't appear to have been successful [2]. We face the same dangers today that we faced 50 years ago, albeit with three times the population, and although technological advances may postpone our troubles, we must reach a more permanent solution.

Overpopulation and Freshwater

Of the resources projected to be insufficient for maintaining the current human population, water is one of the first. The United Nations projects that by 2025, approximately 1.8 billion people will live in "absolute water scarcity" [3]. The results of overpopulation with regard to water shortages can already be seen globally. In an article published in the September 2002 issue of the National Geographic Magazine, Fen Montaigne describes a situation familiar to those coping with water shortages: "If ever a place needed moisture, this hamlet in the desiccated Indian state of Rajasthan was it…. Farm plots had shriveled, and men had fled to the cities seeking work, leaving those behind to subsist" [4]. Montaigne highlights more dismal news, citing the failure of China's Yellow River to reach the sea over the past decade, because of excessive "siphon[ing] off by farmers and cities," as evidence of a common problem [4].

As Montaigne's reference to the Yellow River demonstrates, much of freshwater depletion may be attributed to inefficient irrigation. About 97 percent of the Earth's water is saltwater [6]; of the fresh water that constitutes the remaining three percent, two percent is locked away as ice, leaving one percent for terrestrial life. Of this one percent, approximately 70 percent is used for agriculture [6]. In 2000, while the United States used 49 percent of its freshwater for agriculture, Africa and Asia used almost 90 percent of their freshwater for agriculture [7]. Clearly, improvement in some regions is possible.

Many experts describe the depletion of fresh water as a cycle, fueled by increasing demand from a growing population and sustained by inefficient practices employed to meet this demand in the short-term. Research in India has revealed that many of these inefficient practices, such as over-pumping and flood-irrigation, are subsidized by the government [4]. The Indian government, for instance, heavily subsidizes electricity for farmers' irrigation pumps, which use water from wells [4]. Prolonged use of these pumps, however, has led to depletion of the water table in several agricultural regions; because of the subsidy, farmers are encouraged to cheaply drill wells deeper to reach an ebbing water supply rather than spend to employ more conservative techniques [4]. The American Ogallala aquifer of the Great Plains is disappearing for similar reasons [8]. Lester Brown, president of the Earth Policy Institute and writer for The Futurist, estimates that approximately 400 million people are being fed by "overpumping water," a process which, he states, is "by definition short term" [6].



China's Yellow River has failed to reach the sea over the past decade. Reproduced from [14]

Relevant to the dwindling fresh water supply is the difficulty of growing enough food to sustain a growing global population. As Brown points out in his article "How to Feed 8 Billion People," signs of an impending food crisis can already be seen by examining food prices in recent years [6]. Global prices of wheat, rice, corn, and soybeans nearly tripled from 2006 to 2008 [6]. Brown claims that this recent surge, and the world's struggle to feed its people overall, is the result of two trends: "demand-side" and "supply-side" trends. The greatest of the demand-side trends is population growth; each year, farmers must feed an additional 80 million people [6]. This task, Brown argues, is made monumentally more difficult by ongoing supply-side trends including soil erosion, the loss of cropland to non-agricultural uses, and, most notably, scarcity of water [6]. The effects of overpopulation upon food supply may be seen more tangibly in the increase of undernourished people; while there were "only" 827 million from 1990-1992, there were 1.02 billion in 2009, representing a proportionally decreasing but an absolutely increasing number of undernourished people [9].

Technological Solutions

Several methods have been proposed to combat freshwater depletion. Authors Gude, Nirmalakhandan, and Deng state in their article "Renewable and sustainable approaches for desalination" that desalination and water recycling techniques are promising for fighting water depletion [10]. They assert that several existing distillation and recycling techniques—including phase change processes such as solar

© 2011, The Triple Helix, Inc. All rights reserved.

distillation, non-phase change processes such as reverse osmosis, and hybrid processes involving a combination of the two—can be coupled with renewable energy sources to create cost-effective and efficient water purification and recycling techniques [10]. While some techniques, including the use of solar ponds for solar distillation, are valued for their ability to desalinate and purify water at low costs and low maintenance, others, such as reverse osmosis powered by the ocean's waves, are valued for the predictable availability of their power sources [10]. The authors admit, however, that "the applicability [of these techniques] depends strongly on the local availability of these [energy] resources and the quality of feed source to be desalinated" [10]. Thus, such techniques could realistically be employed in only certain parts of the world with reliable natural and, in most cases, financial resources.

> **"Overpopulation poses a significant threat to life"**

Some experts propose a revolution of irrigation technology, suggesting that farmers switch to overhead sprinklers or drip irrigation, which Brown dubs "the gold standard of irrigation efficiency" [6,13]. According to Long Nguyen, Head of the Soil and Water Management and Crop Nutrition Section, drip irrigation could reduce water use by approximately 50 percent while also raising crop yields [13]. Among the three largest agricultural producers, drip irrigation is used on approximately three percent of irrigated land in China and India and approximately four percent in the United States [6]. The potential benefit of a large switch to drip irrigation is evident. The costs of this switch, however, may prevent it from happening; drip irrigation, while more economical in the long run, is expensive in the short term. Perhaps such financial barriers could be circumvented if government subsidies funded switches to drip irrigation rather than the inefficient methods currently being used.

Confronting Overpopulation

Ultimately, while these countermeasures might stave off the immediate dangers of overpopulation, experts argue, a more permanent solution must be implemented. As Tom Flynn points out in his article "Too Many People," common sense dictates that the earth cannot sustain an eternally growing population [1]. He and several others argue that a more permanent solution, such as a decrease in global population, must be reached. However, as both he and Deborah Rich, in her article "Hold Steady," explain, there are several social stigmas opposing this change.

One social stigma, Flynn reveals, is the unfounded perception that a decrease in population is a bad thing [1]. The Vatican, for instance, when posed with the "problem" of Italian population decline, quickly issued a statement urging Italians to "reverse 'the crisis of their birthrate' by having more babies" [1]. Large populations, he points out, are also subsidized by governments: both Sweden and Italy offer tax breaks for parents. Singapore's government provides matchmaking services, and, perhaps most provocatively, while fighting for a bounty of 2000 dollars for each baby born, Australia's treasurer, Peter Costello, advised his fellow Australians to "go home and do [their] patriotic duty tonight" [1].

Another social stigma is the fear of what might occur if a decrease in population is mandated—the fear that a situation similar to that in China might arise. Stories of children being hidden because of the "one child" law and of baby girls being killed deter official action in the direction of population control.

As Deborah Rich argues, there are also economic stigmas opposing population decrease [3]. For decades nations have practiced economics that focus upon the gross domestic product (GDP) of their populations [3]. Population increases lead to increases in GDP, a fact which, Rich argues, has led nations to encourage continuing population growth [3]; as Flynn points out, however, the fact that national economies have functioned this way does not justify inaction regarding population increase [1]. The perception that national economies will crash if the population is reduced is not necessarily true; it is imperative that nations implement solutions other than population growth to counter economic problems.

Overpopulation poses a significant threat to terrestrial life, including humans. The effects of overpopulation, namely the scarcity of fresh water, can already be seen in some parts of the world; with a climbing population, these issues will only intensify. Population control remains a rocky issue, complicated by social and economic perceptions of population decline as well as dated subsidy policies that only contribute to overpopulation and the depletion of water. The threat remains, and although technological advances in agriculture and water purification and desalination may postpone problems, evidence suggests that a more permanent solution in the form population reduction is necessary. ■

Shivang Desai is an undergraduate student at Brown University.

References

1. Flynn T. Too Many People. Free Inquiry 2004 Aug/Sep; 24(5): 23-27.
2. World Development Indicators. The World Bank; 2010 Dec.
3. Rich D. Hold Steady. Earth Island Journal 2009; 24(2): 40-43.
4. Montaigne F. Water Pressure. National Geographic 2002 Sept; 202(3): 2.
5. Haitian Irrigation Canal [image on the internet]. 2009 July. Available from: http://haiti.usaid.gov/press/frontlines/fl_jul09/p1_haitifarms070903.html
6. Brown LR. How to Feed 8 Billion People. Futurist 2010 Jan/Feb; 44(1): 28-33.
7. Vital Water Graphics: An Overview of the State of the World's Fresh and Marine Waters. Norway. United Nations Environment Programme; 2008.
8. Schnoor JL. World Water Woes. Environmental Science & Technology 2007 Dec 1; 41(23): 7953.
9. The State of Food Insecurity in the World. Food and Agriculture Organization of the United Nations; 2010.
10. Gude VG, Nirmalakhandan N, Deng S. Renewable and sustainable approaches for desalination. Renewable & Sustainable Energy Reviews 2010 Dec; 14(9): 2641-2654.
11. Flood Irrigation Picture (U.S. Department of Agriculture Image) [image on the internet]. 2010 [updated 2010 July 29; cited 2010 Dec 21]. Available from: http://www.mt.nrcs.usda.gov/recovery/BuffaloRapids.html
12. Drip Irrigation Picture (U.S. Department of Agriculture Image) [image on the internet]. 2010 [updated 2010 Dec 10; cited 2010 Dec 21]. Available from: http://www.flickr.com/photos/48722974@N07/5249420811/sizes/o/in/photostream/
13. Drip irrigation makes efficient use of scarce water resources [radio broadcast]. United Nations Radio. Vienna, Austria. United Nations Radio; 2010 Mar 23.
14. NASA image created by Jesse Allen, using Landsat data provided by the United States Geological Survey. Available online at http://commons.wikimedia.org/wiki/File:Yellowriver_etm_2000123_lrg.jpg

© 2011, The Triple Helix, Inc. All rights reserved.