Water Sustainability for People's of the World: Nexus to the Food Production

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The problems facing the world with supplying clean fresh water to the peoples of the world are exponentially growing, and are impacting energy, the environment, agriculture, and the health of people in both the developed and most urgently the developing world. Almost 2.4 million people die yearly from contaminated water, most of these children under 5. 2.85 billion are sickened every year, and hundreds of millions lose a years work, with enormous cost to the economy and people's standard of living. The effect of lack of water on food production is even harder to quantify. An important indicator is the loss of food production due (1) lack of water supply, (2) loss of food production capacity due to increasing salinity of irrigation waters, and (3) amount of sickness and stunted growth due to lack of food, or poor quality food due to bad water. Unfortunately, these indicators are very difficult to quantify. However, it is imperative that we do so. The cost to supply clean fresh waters for the peoples of the world in the coming decades with current technologies is staggering (trillions USD) and are rising rapidly. Rapid and massive development of water science and new technologies in the next ten years is needed to affordably secure the water needs for the peoples of the world. New water technologies are needed to clean impaired waters, reduce the salinity of brakish waters for irrigation, disinfect water from a host of pathogens without adding salts and toxic compounds, reuse waters while extracting energy and chemical nutrients, in particular phosphates and reactive nitrogens that can be used in fertilizer, and desalinate seawater and importantly inland saline aquifers that underlie most of the world to increase supplies. Better ways to manage water, save water from being wasted, and distribute water safely are also needed. Solutions are needed at every level, from sophisticated large systems to simple point-sources, point-discharge, and point-of-use systems. Perhaps the biggest indicator of success is what the food production is per unit of available water and nutrients, in particular in water scarce regions. Only recently has indicators of calories per unit volume of source waters been considered. We now need to add per unit salt loading. Fortunately there prospects for hope that we can help find solutions: We are far from the natural law limits for separations in water, and nature provides us many examples of biological systems that do a better job of purifying water than current human systems. Everyone is needed to help to solve some the most pressing problem facing the world with water in the coming decades.