Evidence #1: Land use changes have generated large pressures on freshwater resources. These changes are affecting both water quality and availability.

Farming, mining, and forestry require large amounts of water. Almost half of our land is used for farming. As populations continue to grow, there will be less water available to use for crops. In countries where climate change has affected weather patterns, there will be even less available water. Such countries include the Philippines, Pakistan, Vietnam, and Australia.

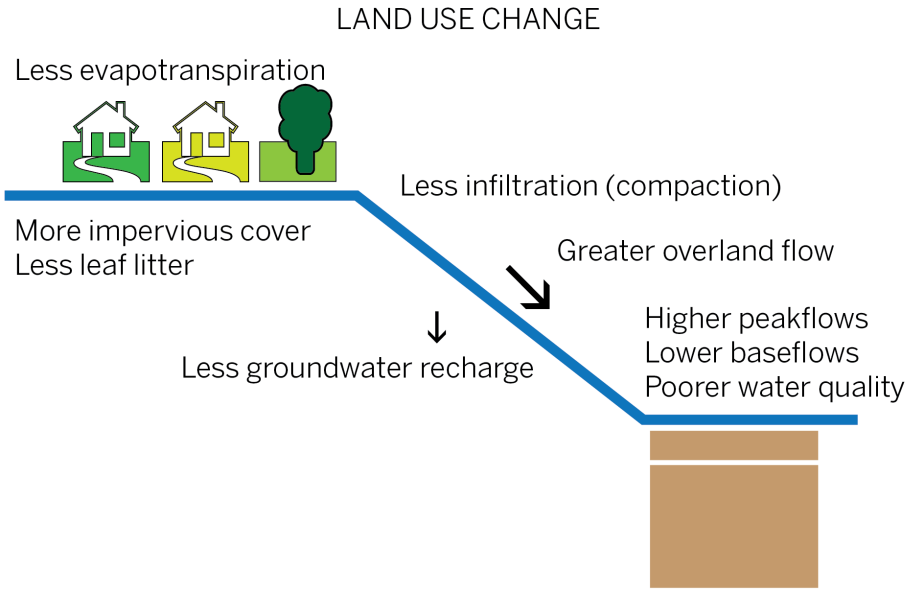

Figure 1: Changes in the movement of water when land use changes. Credit: Wright Seneres

As land use is changed, the water cycle is altered at local and regional levels. Figure 1 shows that increasing the amounts of solid surfaces leads to greater runoff. Houses, roads, and other structures block some water from going into the ground. When this happens, more water runs off into local bodies of water. The water that runs into the local bodies of water includes anything that it can carry along the way. This can decrease water quality.

Evidence #2: The world's population is increasing. This stresses the supply of freshwater.

Each person requires at least 50 liters/day of freshwater for drinking, eating, and cleaning. There are more than 7.5 billion people in the world. By the year 2050, there will be 9.5 billion people. In the next 30 years, the amount of people living in cities will also increase. This will stress the supply of freshwater.

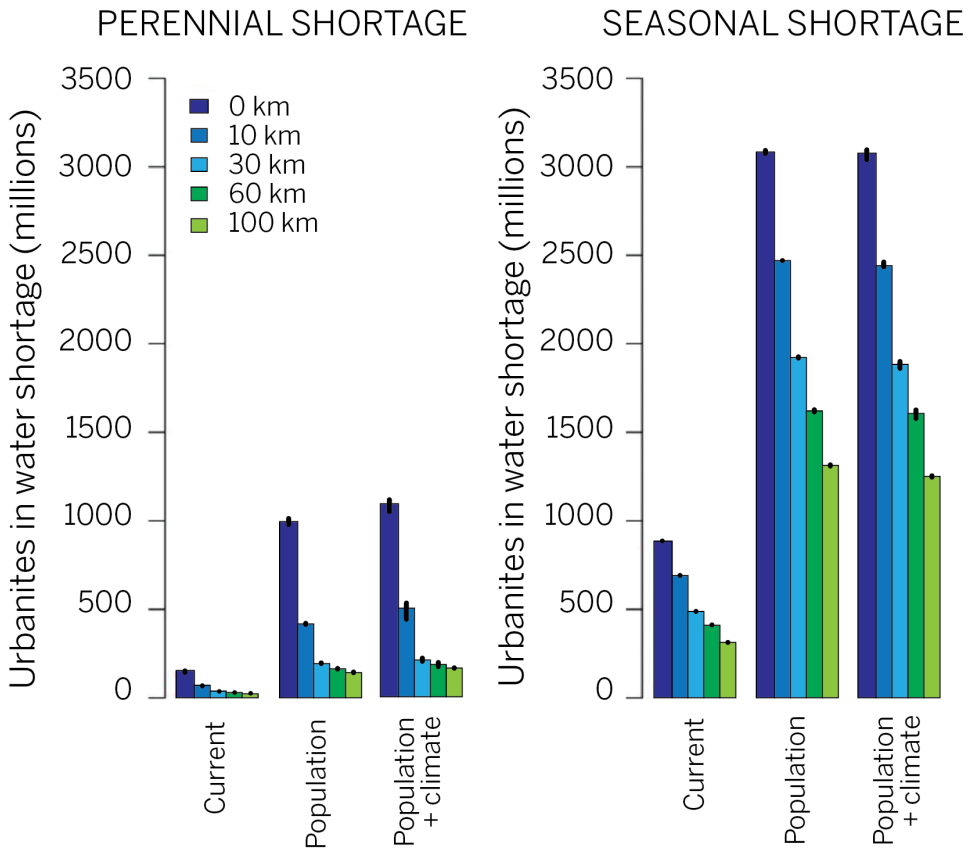

Figure 1. Urban populations affected by freshwater shortages. Credit: Wright Seneres from United Nations data.

Figure 1 above shows water shortages in cities. On the left are yearly amounts and on the right are seasonal amounts. Water shortages occur when an urban area has 100 liters (or less) of water per person per day. The bars show different distances from urban areas. Shortage numbers are represented in three categories: (a) current population, (b) 2050 population, and (c) 2050 population growth plus climate.

Evidence #3: Water reclamation and desalination costs are expensive. These costs vary depending on location.

Dirty water, also called wastewater, can be converted for future use. This process is called reclamation. Sometimes, dirty water can be converted into drinking water. Drinking water is also called potable water. Reclamation costs a lot and uses large amounts of energy. The cost of reclamation varies by location. It depends on the level of treatment and distance the water needs to be transported for use.

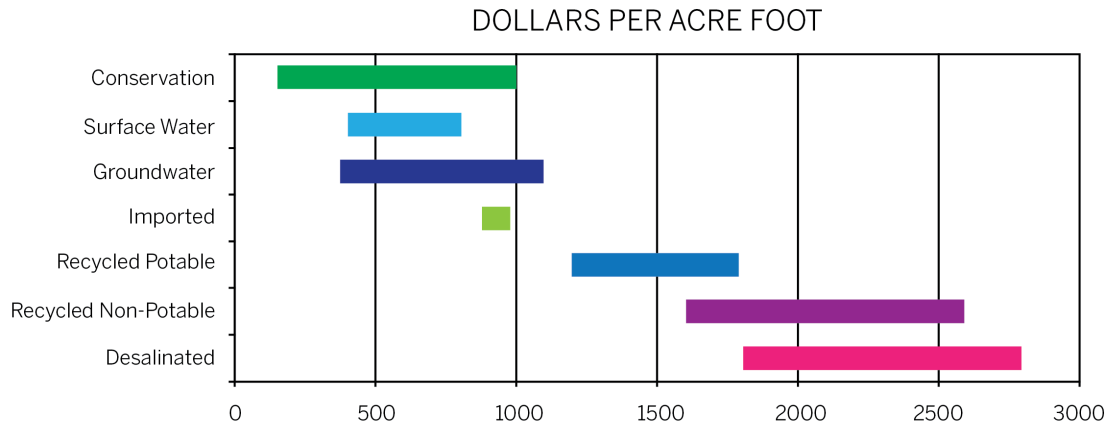

Figure 1. Water costs in 2010 for San Diego County, California. Credit: Wright Seneres based on NRC (2012).

Figure 1 shows how much certain types of water cost in the year 2010. The dark blue and purple bars show reclamation costs for drinking water and wastewater. The pink bar shows desalination costs. Desalination is the removal of salt from saltwater. These costs are in dollars per acre-foot (a unit of volume, where 1 acre-foot is just over 320,000 gallons or 1.2 million liters).

Evidence #4: Advances in engineering have led to better access to quality drinking water. At the same time life expectancy and quality of life have improved.

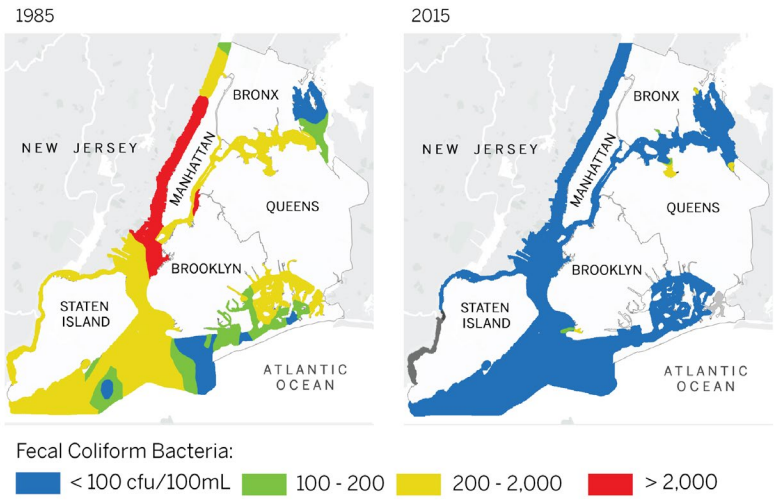

Figure 1. Changes in fecal coliform counts over time. Credit: Wright Seneres.

Figure 1 above shows data from New York City. It shows how water quality has improved since the year 1985. Fecal coliforms are a bacteria that make the water quality worse. The figure shows how fecal coliforms have decreased. New York City spent about $10 billion on improving the quality of water.

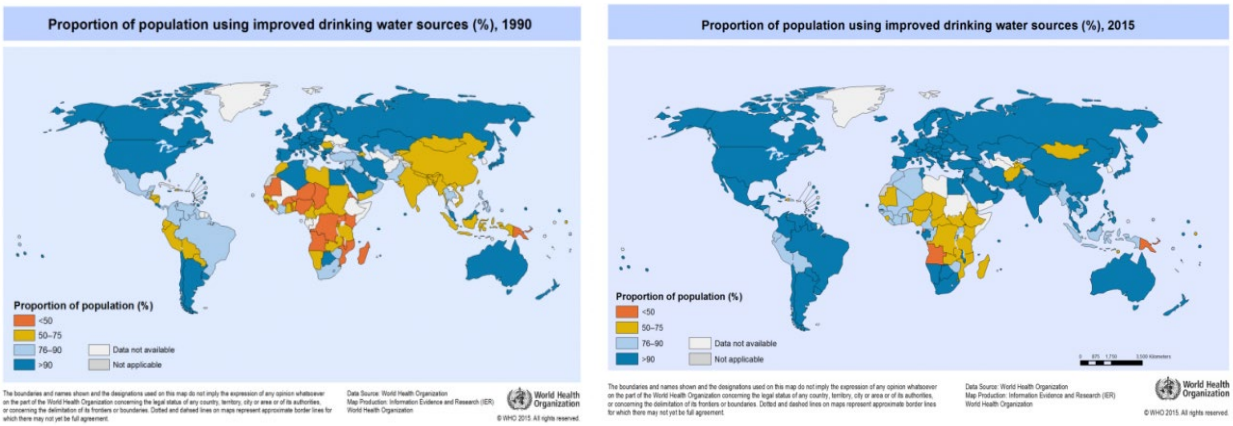

Figure 2. Proportion of population using improved drinking water sources in 1990 (left) and 2015 (right) ()

The quality of water has increased around the world. Figure 2 shows how the proportions of the world's population have more and better access to drinking water. Dark blue shaded areas show where 90% of the people have access to improved drinking water.