Water Loss Drop by Drop

Objective: Describe measures that can be taken to reduce water losses through irrigation, industry, and home use.
- Estimate household water loss from common leaks
- Extrapolate water loss to the surrounding community
- Identify water resource issues
- Describe solutions for improving water resource problems

INTRODUCTION
Leaks in water lines waste an extremely valuable and diminishing resource'. New York City's Department of Environmental Protection estimates that leaks make up about 10% of the water demand of the city. In the last 15 years New York City has examined 31 million feet (5,871 mi} of the 33.6 million feet (6,364 mi) of water mains and eliminated 89 million gallons/day in leaks. The Boston Water and Sewer Commission surveyed 819 miles of its 1,182 miles of water distribution mains and fixed 427 leaks out of 444 leaks found, saving 7.16 million gallons/day.

Water losses in the developing world are more severe. In Iran in 1997, for example, 30% of the 3.8 billion cubic meters (1 trillion gallons) of treated water for the public was lost. This loss took place in a desert country with a population growing at an annual rate of 1.75%.

It might seem that with such large-scale losses in distribution systems, little domestic leaks are of little consequence. This exercise will show that when minor events occur often and long enough they result in large effects.

CALCULATIONS
  ✓ *Always show your set-up and work.*
  ✓ *Show all units to help guide you.*
  ✓ *Make sure you identify the units that answer the question.*
  ✓ *Explain any other assumptions you make.*

Problem: On average, a household size is four people and there are approximately five water sources (faucets and toilets) in each household. Assume that two of the faucets each leak at the rate of 1 drop/sec. Use the data table of local populations and the stated equivalences provided to calculate water losses.

Community	Population
Rolling Meadows	25,000
Arlington Heights	75,000
Mt. Prospect	55,000
Illinois	12,900,000

Equivalences: **20 drops = 1 milliliter**   **3.8 liters = 1 gal**

                     1 gal = 0.133ft^3   **1 ft^3 = 7.5 gal**

Equivalences/conversion fractions stated in the Problem. (*There are at least 3.*)

1. Calculate the gallons of water lost by each household annually.

2. How many gallons of water are lost annually in your community or county?

3. What percent of the total water consumption does that community loss represent? Assume a typical person averages 100 gal of water used per day.

4. Use the analogy of a football field to illustrate how much the above water loss really amounts to. The analogy should be an indication of the total volume in cubic feet. The dimensions of a football field are approximately 300 ft long and 180 ft wide.

   How many feet deep will the water amount to on the football field?
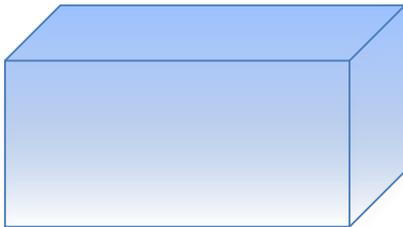
DISCUSSION

5. Describe 10 actions you could take in your own home to conserve water. Estimate what percent of your total household consumption your savings represent.

6. Describe 5 characteristics of water that make life possible.

7. Name five western states where water conflicts are likely. What are the cause(s) of the conflict(s)?

8. What are some of the limitations of the following:

    a. Desalinization

    b. Water privatization

9. If you were an advisor to the government charged with improving water resources, describe *five* recommendations that you would make. Consider environmental as well as economic factors or constraints.