1. A farmer on the Chesapeake Bay in Maryland has a 200-acre tract of land that is in “mixed land use” with a silt loam soil and an average slope of 10%. His property is next to a very sensitive oyster bed and he must submit an application to the State to convert his “mixed land use” tract to corn production. You work for the Environmental Impact Assessment Division for the State of Maryland and have been requested to determine the change in runoff and sediment that would result if this 200 acres were converted from “mixed land use” to corn.

**Given:**

Figure 1.1

**Required:**

For this 200-acre field, for a 2-year period, calculate:

A. The change in the average sediment yield
B. The change in the peak runoff rate for a 10-year, 24-hour storm
C. State any assumptions you make in your calculations.
D. Design a system to reduce the sediment load to the Chesapeake Bay from the new corn field. Provide a sketch of your proposed solution.

**Note:** This is a conceptual problem.

2. In Figure 1.1 the average sediment yield over two years for corn (#7) for 20 acres was 1000 tons. 1000 tons is a lot of weight! If the bulk density of the silt loam is 1.2 g/cm\(^3\) and the specific weight of water is 1 g/cm\(^3\), what depth of soil (in inches) is lost from the 20-acre site over this two-year period?

**Required:**

a) What is the definition of bulk density?
b) What is the bulk density of the silt loam in lb/ft\(^3\)?
c) What is the specific weight of water in lb/ft\(^3\)?
d) How many inches of soil eroded from the soil surface for the 20-acre site given in Figure 1.1 over the two-year period when corn was planted?

**Hint:** Convert all units to pounds and feet for the calculations, and then convert feet to inches in the last step.
3. Use the internet to find stream systems near your hometown and answer the following questions.

   A. What river basin do you live in?
   B. Where does all of the surface runoff from your house end up?

   **Note:** If possible, turn in a map with the answers to the above questions.

4. Carter’s Creek near College Station is 20.5 square miles in drainage area. If there was 8 mm of runoff in January 2007 how much water flowed in Carter’s Creek during this runoff event?

   A. In acre-feet
   B. In cubic feet
   C. In gallons