Physical Hydrology for Ecosystems
BEE 371

Assignment #2: Watersheds and Hydrology (due Feb. 10, 2009)
The purpose of this lab is to familiarize you to determining watershed characteristics. For this assignment we'll use a topographic map to summarize the general characteristics of the Sixmile Creek watershed. Summarize the following information in a clear, meaningful format (1-2 pages max) and answer the questions below.

General Watershed Characteristics

- Drainage Areas (Area of watersheds)
- Length of longest flow path
- Total stream length (sum of all stream segments)
- Number of 1st order, 2nd order, etc… streams
- Largest stream order
- Drainage density

Questions
1) Use the USGS website (http://ny.water.usgs.gov/) to find the annual discharge data for Sixmile Creek. There are lots of ways to navigate this site and it seems complicated the first time you use it but gets easy quickly. For this assignment you can click on: Surface Water (not real-time), in the “select site by name or number box” type “Sixmile Creek” and submit, click on the site number, and then choose Time-series: Annual statistics from the drop down menu. Check the box by the “parameter code” and submit. You should be at a screen that has the data you selected. What's the average annual discharge over the past five years in ft³/s, m³/day, m³/yr, cm/day, and cm/yr?

2) Find local precipitation data on the Internet: e.g., http://www.nrcc.cornell.edu/ (there are other sites that might be better). What was the precipitation over the past five years in m³/yr, mm/day, and cm/yr?

3) Assume that internal water storage in the watershed is negligible over five years (dS/dt = 0). Calculate the average annual evapotranspiration (ET) over the past five years (use the average values from (1) and (2)). What's the average annual ET in m³/yr, cm/day, cm/yr and m³/yr/m² of watershed area? (The last value is the same as m/yr but when we get to ET we will be considering various energy fluxes in terms of energy/m² so it's good to get used to thinking this way). What fraction of the precipitation is lost to ET?

4) What fraction of the precipitation leaves the Sixmile Cr. watershed via stream flow?

5) Sixmile Creek is the main water supply for the City of Ithaca, pop. ~30,000. Compare the water supply demand to the available water, i.e., precipitation-ET (consumption is ~50 - 150 gal/day/person).

EXTRA CREDIT:
1) Look at the entire record of stream flow (beginning in the 1920s) for Fall Creek and precipitation and determine if there are any long-term trends in annual ET. Historical monthly precipitation is available at: http://cdiac.ornl.gov/epubs/ndp/ushcn/monthly.html.

2) Find two to five similar-size watersheds with different drainage densities and see if there is any relationship to ET or fraction of precipitation that leaves as stream flow.