

## Land Use Change Introduction

**Time:** 1-2 periods

**National Benchmarks:** Benchmarks 5A: Diversity of Life; 5D Interdependence of Life; 5E: Flow of Matter and Energy; 9B:Symbolic Relationships; 9D:Uncertainty; 12B:Computation and Estimation; 12D:Communication Skills; 12E:Critical-Response Skills.

**National Science Content Standards:** *Science as Inquiry: A; Life Science: C:* Biological Evolution; The Interdependence of Organisms; Matter, Energy, and Organization in Living Systems; *Science and Technology: E:* Abilities of Technological Design; Understandings about Science and Technology; *Science in Personal and Social Perspectives: F:* Population Growth; Natural Resources: Environmental Quality; Natural and Human-induced Hazards; Science and Technology in Local, National, and Global Challenges

**New York State Standards:** 1, 2, 4, 5, 6, 7

**Objective:** Students will know the major changes that have taken place in the Hudson Valley over the last 400 years and be able to use aerial photos to describe major trends.

### Lesson Outline:

1. Students brainstorm major changes in the Hudson Valley since the arrival of European settlers
2. Students look at aerial photos and discuss them to determine major trends in Dutchess County
3. Students view powerpoint presentation

**Materials:** aerial photos, powerpoint presentation, grid overlay

**Preparation:** Decide whether you want the students to use the grid overlay to quantify the percent of land use change on each photo. If so, then print out the attached chart overlay on transparency sheets, as well as the aerial photos.

**Engage:** Students should pair up and list three major changes that have taken place in the Hudson Valley since the arrival of the European settlers. Ask students to discuss their ideas as a class. Have them make predictions about each of the different components on the first powerpoint slide: population, forests, agriculture, dams, wetlands, housing, and roads. Other categories could be added if students suggest them.

**Explore:** Each group will get different sets of aerial photos, one from the 1930s and another from 2000. Although all of these photos are from Dutchess County, other counties mimicked the changes in Dutchess County. Students should write down the major trends that they see from the photos, and then use the chart overlay to quantify the different land use types. They may need some help to identify the features in the aerial photos. A good handout for using aerial photos can be found at the Garden Mosaics website: <http://www.gardenmosaics.cornell.edu/pgs/science/english/aerial.aspx> . For instance, if a student's photo has 17 boxes of developed land, 80 boxes of agricultural land, 20 boxes of forest, their percentages will be as follows:  $17/117 = 15\%$  developed,  $80/117 = 68\%$  agriculture,  $20/117 = 17\%$  forest.

**Explain:** Using the powerpoint presentation, guide students through the major changes since the arrival of the Europeans. For a thorough overview of the changes in the watershed, use the Swaney et. al. paper as a reference. In general, population has grown from 230,000 in 1790 to 5 million today. While the watershed was almost entirely forested in 1600, almost 70% was converted into agriculture by 1880. Much of that farmland has now reverted back to forest, both as a response to soil productivity declines and a changing industry. Forestland was first exploited for lumber and the tanning industry, and afterwards for pulp for paper. There are almost 800 dams in the watershed, most of them not serving any useful purpose anymore.

**Extend:** Students can research one specific geographic area and determine how it has changed, or use historical documents to look at changes in different species distribution and concentration.

**Evaluate:** Ask students to complete a 'minute-paper' describing the major changes they have learned about.

**Comments:**

**References:**

Swaney, D., Limburg, K., and K. Stainbrook. 2006. Some Historical Changes in the Patterns of Population and Land Use in the Hudson River Watershed. *American Fisheries Society Symposium*, 51:75-112.

