



Studying Local Land Use

Middle School Students Performing CAP LTER Research

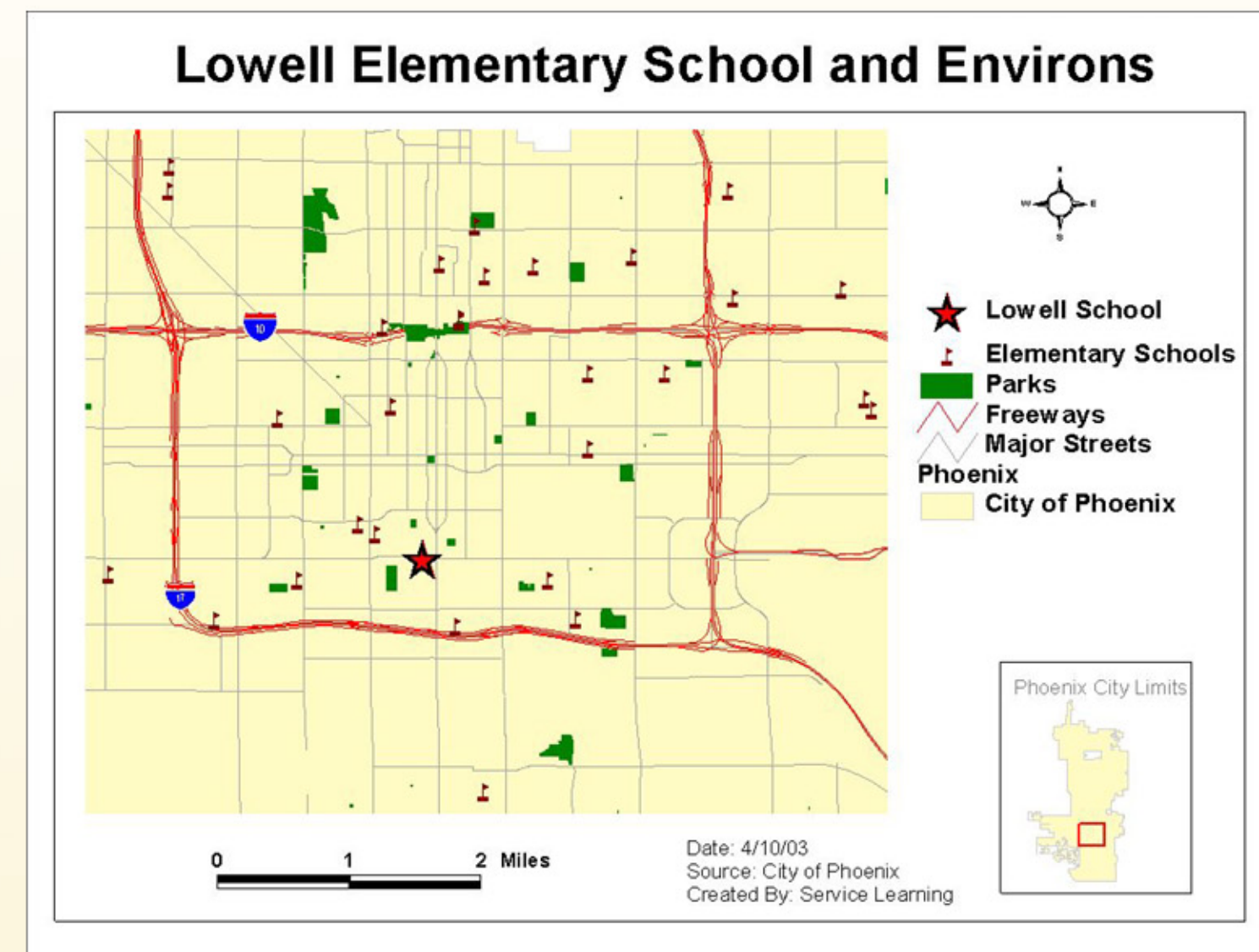


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Project Overview

Lowell School

Lowell School is a K-8 school in Phoenix Elementary School District in Phoenix, Arizona. In the fall of 2004, students in Mrs. Beacom's 7th & 8th grade science class learned GIS and utilized it to study the land use of three areas near to where they live.

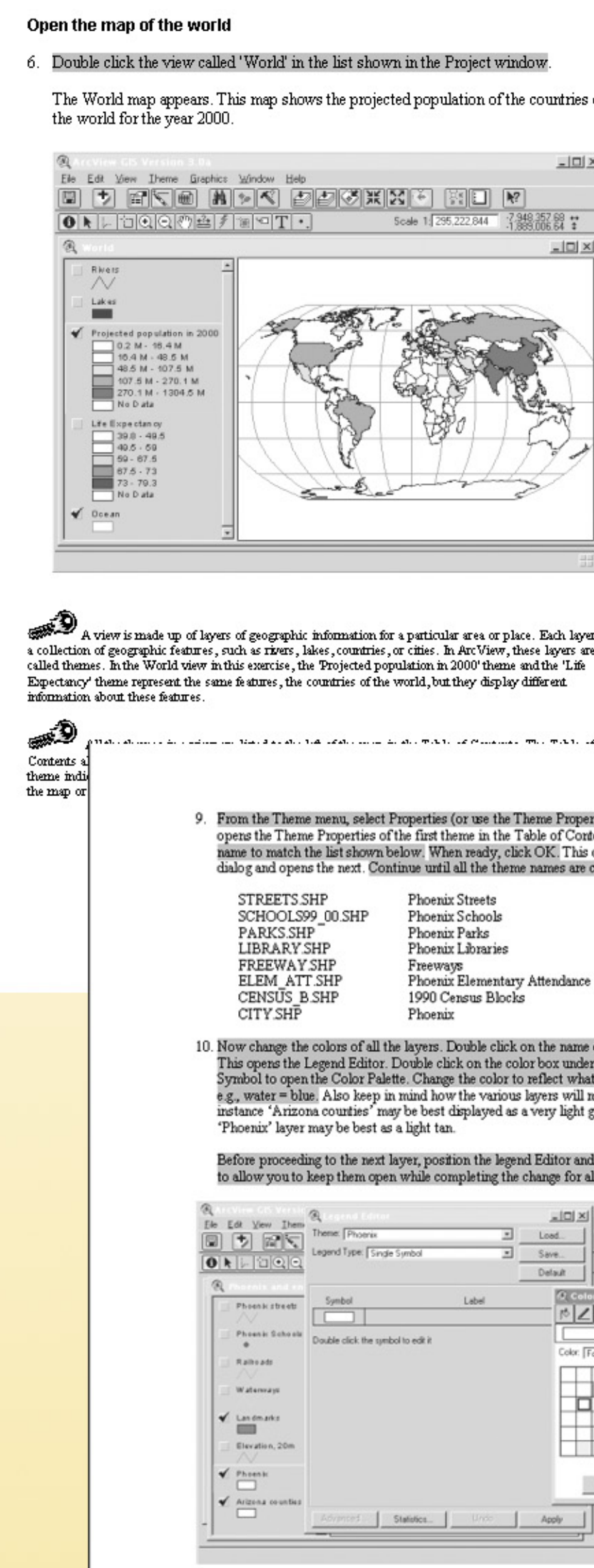


Service Learning

The ASU Service Learning Program coordinates a GIS internship which allows ASU interns to travel to Lowell and teach the Lowell students how to use GIS to study their world. Service Learning is "experiential learning." It uses service to the community to enhance the educational process. For information concerning the ASU Service Learning Program go to: <http://www.asu.edu/duas/servicelearning>.



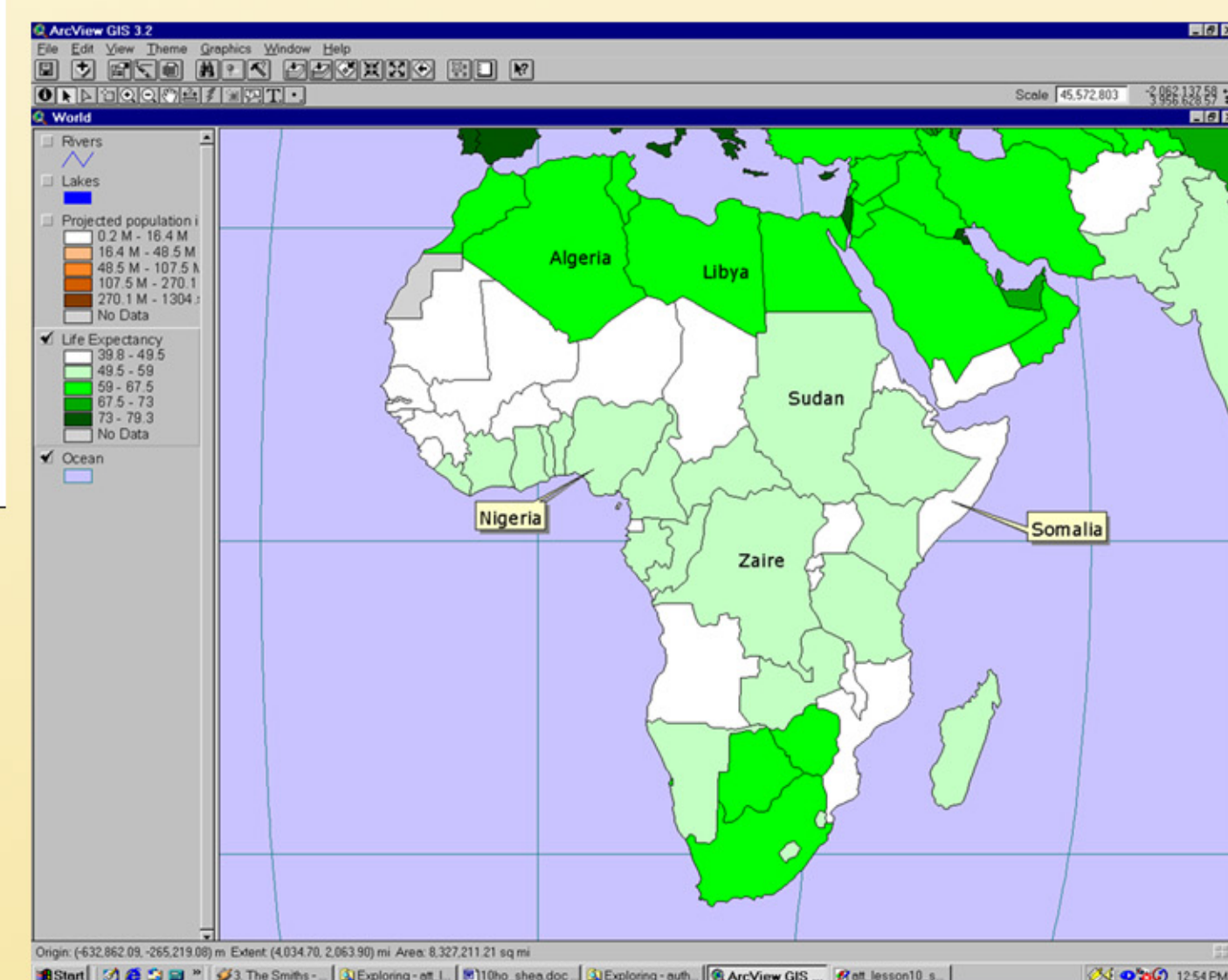
Learning to use Geographic Information Systems



The students used the AuThenTICITY curriculum as a resource for learning ArcView, a GIS software package. The City of Phoenix and ESRI provided GIS data for the lessons. The lessons begin with the most basic GIS functionalities and progress to more intense exercises.

Explore the map you have created
Before moving to the step of adding to your research data, take some time to explore the map you have created. Prepare the slide you have been given.

The students learned how to use ArcView in 8 class periods, which is only 8 hours. Once the students learned how to use the software, they were expected to use all of the skills they learned to map their community and then moved on to creating data for land use.



Excerpts from the AuThenTICITY curriculum

AuThenTICITY



The ASU interns used the AuThenTICITY curriculum to teach the Lowell students how to use GIS. AuThenTICITY is a service learning curriculum which incorporates Geographic Information System technology. It is designed to actively engage youth in community problem solving through three modules: Community Awareness, Community Research and Community Action. AuThenTICITY is sponsored by the City of Phoenix, AT&T, and ESRI, Inc. (Environmental Systems Research Institute).

CAP LTER



CAP LTER
Central Arizona-Phoenix
Long-Term Ecological Research

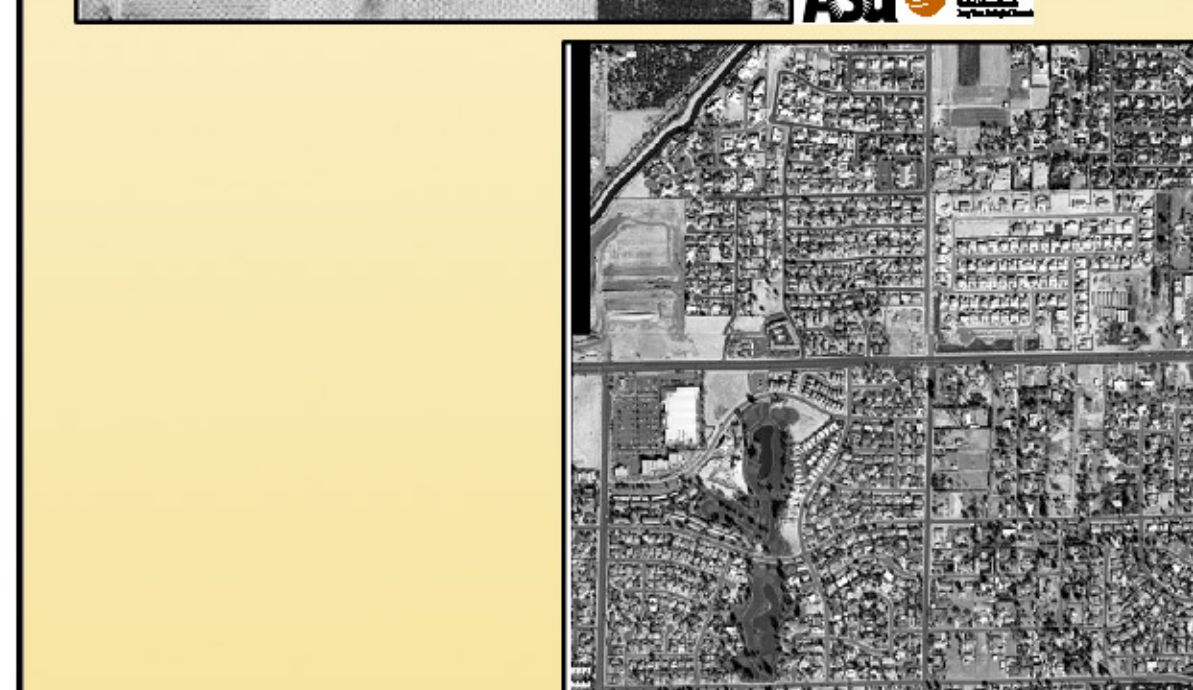
The Lowell students based their work on research projects being undertaken by ASU researchers working on the Central Arizona-Phoenix Long-Term Ecological Research (CAP LTER) project. One project is the Survey 200: Interdisciplinary Long-term Monitoring project which quantifies basic ecological characteristics of study areas and monitors long-term ecological trends over time and space. The research required using aerial photographs to develop land use data for the past 70 years. The Lowell students used CAP LTER methodology to create land use data for areas near Lowell school and then analyzed the changes they found.

Learning About Aerial Imagery and Land Use

The students used lessons developed by Ecology Explorers Education team to learn how to interpret aerial photos. The activity is based on sites from the CAP LTER 200 Point Survey. To learn more about Ecology Explorers and to download the lesson, go to <http://caplter.asu.edu/explorers>.

Ecology Explorers: Historical Air Photo Interpretation
Background: Aerial photographs are one way to look at change over time. In the metropolitan Phoenix area, much of the urban growth has taken place in the last 50 years, so it is possible to find photographs from the same location and see dramatic changes. This activity will encourage your students to think about the process of the changing urban landscape.
Materials: Aerial photographs from several locations taken over time (you can do this activity with just one location, but it is more interesting looking at one aerial photo). You can find maps at <http://www.asu.edu/caplter/arcview/arcview/arcview.html>
Objectives: Identify and describe land use changes over time with historic aerial photos.
Activity: Hand out historical aerial photographs to each group of students. Allow the students to become familiar with the photographs. Use the attached land use categories to identify the area, or create your own land use categories. Have the students identify land use in each of the photographs and discuss changes. See student handout for questions.
Facilitate a discussion about past, present and future trends. Discuss differences among the historical photographs. Are there differences in land use changes in areas that were agricultural vs. desert? How have the changes affected the land use of the area?
Lookfor: Observation of students, completion of activity
Extension: Calculate the changes in land use types over time. Study local historical documents to understand and changes in land use. Inevitably long-term residents or local historians about these changes. Identify social and political impacts of these changes on the community and the environment.

Land Use Categories (adapted from CAP LTER, MAG, and Explorations from an ArcView Perspective)
Residential
Single-family home: small rectangular buildings with shingles, pitched to street, porches, lawns, trees, swimming pools, and detached garages.
Multi-family: large rectangular buildings with flat roofs, multiple stories, and many windows.
Community/Industrial
Business: rectangular buildings, large lots, paved areas, parking lots, and large signs.
Manufacturing: large rectangular buildings with flat roofs, multiple stories, and many windows.
Open Space
Park: irregular shapes, grass, and trees.
Vacant: irregular shapes, grass, and trees.
Public
School: large rectangular buildings, outdoor play areas, and parking lots.
City Hall: rectangular buildings, multiple stories, and many windows.
Water
Canal: narrow waterways.
Lake/Reservoir: irregular shapes, water, and surrounding vegetation.
Agriculture
Crop/Field: rectangular fields, multiple rows, and many windows.
Orchard: rectangular fields with trees.
Transportation
Highway: multi-lane multi-lane roads.
Arterial Road: multi-lane roads, typically lined with businesses, churches, shopping centers.
City Street: narrow roads, multiple stories, and many windows.
Railroad: long, straight lines with tracks.



McKellips Rd. and Stapley Rd. 1970

McKellips Rd. and Stapley Rd. 2000

Questions:

- What were the major changes you observed in your photographs?
- Compare your observations with those of your classmates. Did all of you see the same changes?
- What was the same?
- What was different?
- Is there a difference in land use over time in areas that were formerly desert vs. areas that were formerly agricultural land?
- What do you think will happen to this area in the next 10, 20, 30 years?
- How has the lives changed of people who lived in this area in 1970 as compared to today? What things would be better? What things would be worse?

Legend

1970 Land use category	Comments

Legend

2000 Land use category	Comments

Presenting the Findings to CAP LTER Researchers

The students worked in groups and developed land use data for their study areas. They created maps to help convey their findings and then put their work into a power point presentation.

Phoenix Land Use 1970, 1990, 2004
Lowell School
Mrs. Beacom's 1st Hour Science Class
December 6, 2004

Project Overview
Used GIS to map out land use types in different areas of Phoenix in 1970, 1990 and 2004
Lowell Area
Downtown Area
Sky Harbor Area

Study Area Focus Map

Predicted Land Use Types for Lowell area 1970
Mainly
Open Space, Residential
Some
Agriculture, Hospital (Public)

Predicted Land Use Types for Lowell area 2004
Mainly
Residential, School (Public), Park (Public)
Some
Hospital (Public)

Changes in Lowell area from 1970-2004
More Water - Why
More Commercial
Less Open Space
Less Residential

The Lowell students came to ASU on Monday, December 6th to present their findings to researchers from the International Institute for Sustainability. They gave a 30 minute presentation and then invited questions from the audience. The members of the audience had many questions and were quite impressed by the student's work. The Lowell students were proud to be doing such high level work and thoroughly enjoyed the experience.

