

# Urban Heat Island

CAP LTER Data Explorations



**Author:** Ecology Explorers Team,

**Time:** 15-30 minutes

**Grade Level:** 9-12

## **Background:**

The Phoenix urban core is composed of several contiguous cities and is situated within the Sonoran Desert. This area is being studied by scientists as part of the long-term ecological research network (LTER) funded by the National Science Foundation. Our project, the Central Arizona-Phoenix LTER (CAP LTER) is focusing on researching the effects of urbanization on the surrounding desert ecosystem and vice versa. The Phoenix area is growing rapidly with a population of 300,000 people in 1950 and 3 million+ in 2005. The area receives annual precipitation of 180 mm (6 inches) and can experience summer temperatures as high as 48 C (115 F). The rain comes twice a year (winter & summer), which contributes to the high species diversity of the Sonoran Desert as compared to the North American deserts. Urbanization of this area has led to decreased agricultural development (formerly focused to the west, south, and southeast of the urban core) and increased water control via dams, reservoirs, and canals.

## **Objective:**

Students will analyze patterns of average daytime and night time temperatures in June at various landscape types in the Phoenix Area.

## **Standards:**

### **Science**

## **Advanced Preparation:**

It might be helpful for students to have conducted microclimate studies in their schoolyard.

## **Materials:**

Student Worksheets

Examples of different landscape types

## **Evaluation:**

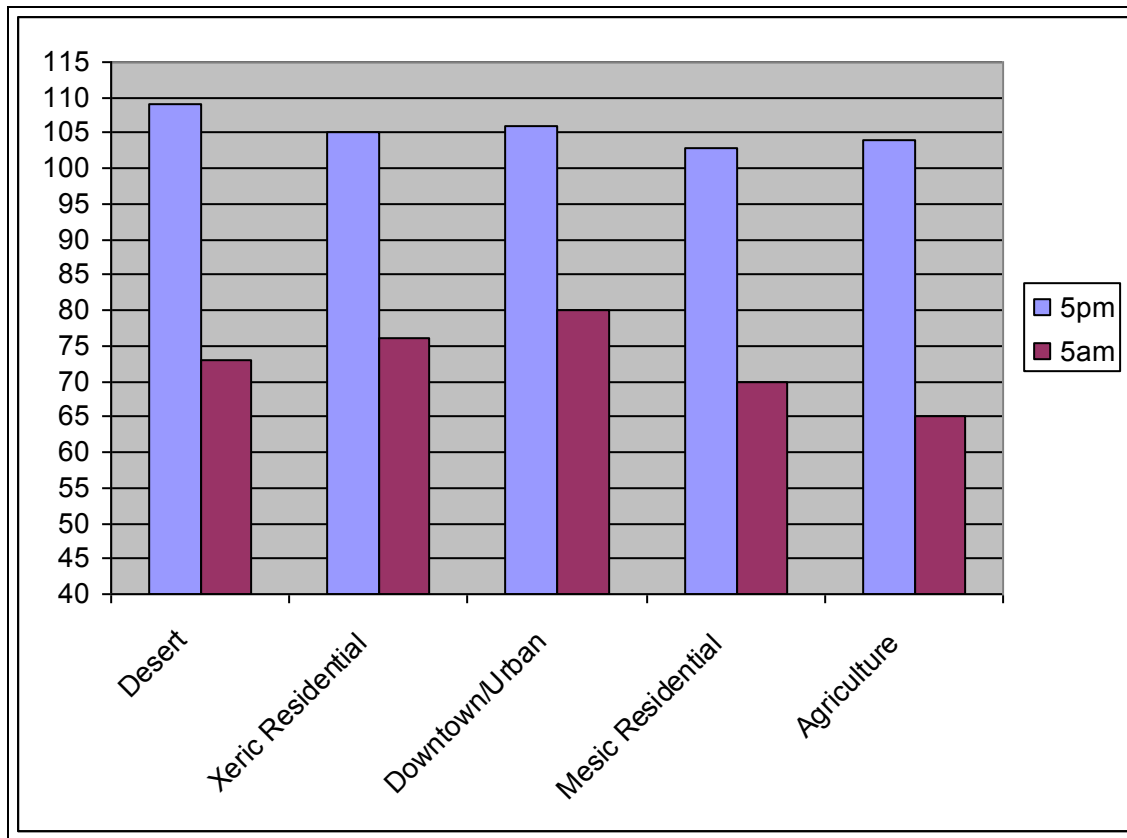
Observation during the activity and participation in discussion.

Student responses to reflection questions.

## **Extensions:**

Have students conduct their own observations of microclimate on campus or their neighborhood.

Have students look at the change in Phoenix over time (<http://caplter.asu.edu/explorers/protocol/landuse/>).

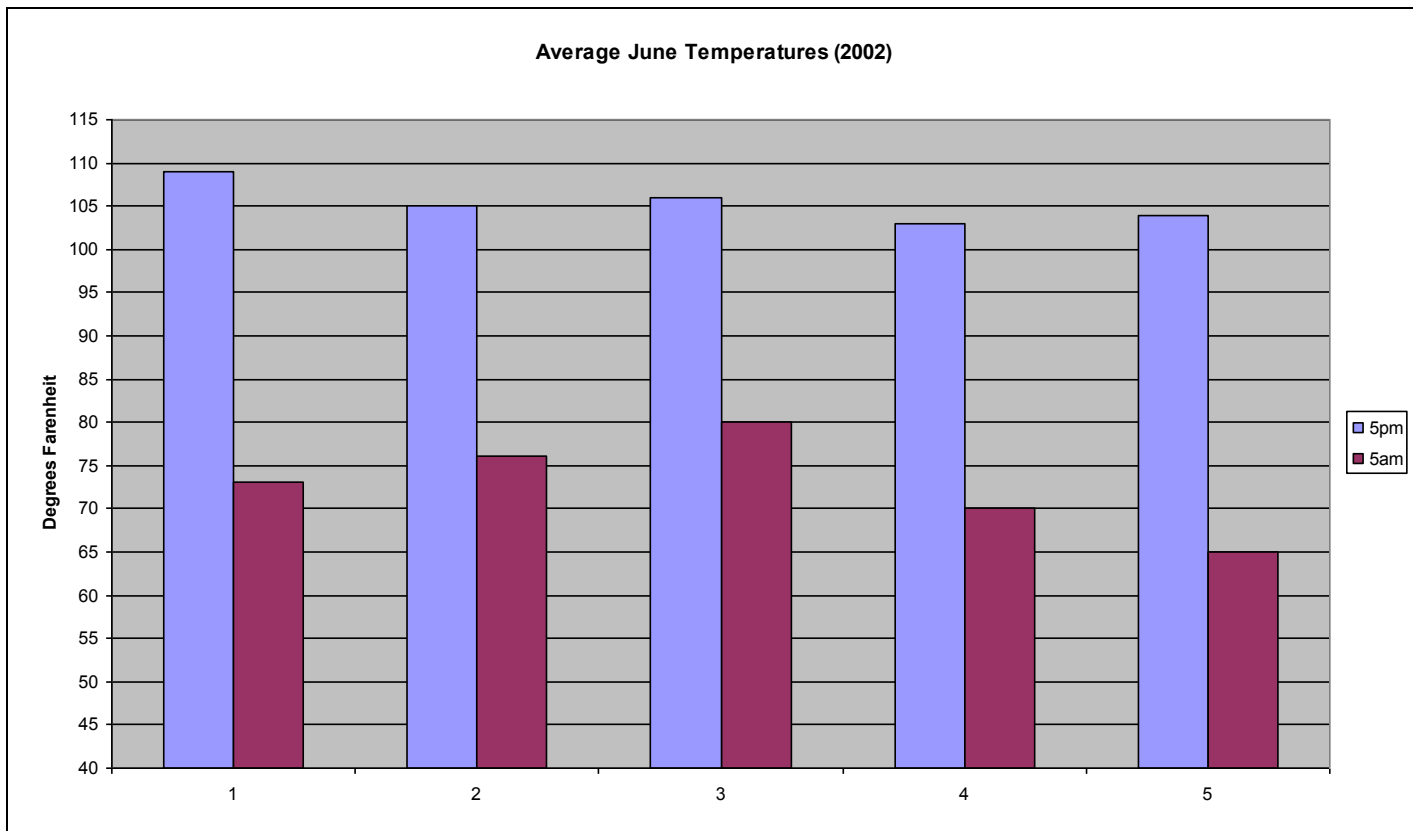


Here are some facts you may wish to share with your students about the Urban Heat Island in Phoenix:

- In the summertime, dark pavement surfaces may reach temperatures of **160°F**.
- Roofs can get to be **190°F** during the summer.
- **40 %** of the urban surface cover in Phoenix is **pavement**; only 15% of Phoenix's surface is covered by buildings.
- The average nighttime low temperature in Phoenix has increased by 8°F over the last 30 years.
- For the months of May through September, the average number of hours per day with temperatures over 100°F **has doubled** since 1948.
- Nearly 6 % of peak energy demand in the summer can be attributed to the rising temperatures of the urban heat island.
- In Phoenix, a pool loses the equivalent of its total volume every year through evaporation. Pools lose almost ½ inch per day in June and July.

# Student Worksheet

## Urban Heat Island



Match the Bar Graphs to the Landscape:

- A= Desert Landscape
- B= Agricultural Land
- C= Downtown Phoenix
- D= Mesic Landscape (lawns, golf courses)
- E= Xeric Landscape (desert plants, rocks, no grass)

Bar Graphs 1: \_\_\_\_\_

Bar Graphs 2: \_\_\_\_\_

Bar Graphs 3: \_\_\_\_\_

Bar Graphs 4: \_\_\_\_\_

Bar Graphs 5: \_\_\_\_\_

# Student Worksheet

## Urban Heat Island



1. Which of these graphs shows the Urban Heat Island?

2. Based on your answer to question #1 and comparing that graph to the other graphs, how would you define the Urban Heat Island?