Back to the Basics

Map Reading and Aerial Image Interpretation

Albuquerque, New Mexico

A Program of CNL World

WORLD

wetmaap.org

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CNL World

CNL World, founded in 2010, promotes education outreach and professional development for environmental and earth sciences formal and informal educators. CNL offers opportunities for educators and the general public to increase and enhance their knowledge and skills in the use of maps, airborne imagery, and satellite imagery for the classroom, for the workplace, and for everyday situations.

CNL World develops programs and materials, provides spatial data, information, geospatial technology, and application training that support and complement educator's existing curriculum. CNL World serves educators with multiple experiences, including diverse underrepresented, underserved, and minority groups.

We invite you to explore our programs, products, and services.

CNL World is a non-profit group

Providing:

- An education focus with opportunities in geospatial outreach
- A service to a community of practice

Using:

- A gateway to classroom resources with methods and techniques through an innovative approach

For:

- The Geosciences
- Earth Science
- Environmental Science

Back to the Basics

"Back to the Basics" is an extension of the WETMAAP Program (Wetland Education Through Maps and Aerial Photograph) and is an innovation of CNL World. The Back to the Basic materials are packaged for use in a mini-workshop (approximately one to three hours), but are easily adaptable to a 50 minute classroom format.

Our experience with developing content and facilitating workshops and training sessions for over 2,000 teachers suggests a need to step-back and reintroduce basic geography tenants–location, map skills, observation, and comparative analysis through the use of traditional tools—maps and aerial photographs. The materials provide training in basic ecological concepts, technological skills, and methods of interpretation necessary for assessing geography, earth science, and environmental science topics.

The Back to the Basics Program provides an excellent opportunity of "science by inquiry" for the classroom. Exercises follow a standardized format. Student learning outcomes are easily measured through application of the same exercise but for a different location. Such replication allows for concept and skill measurement and assessment of student knowledge attainment. Educators can adapt the materials for classroom station work or group activity, as well as for individual use. The Back to the Basics exercises, while simple, challenges students to make observations, use geographic tools (*i.e.,* a map and an aerial photograph), compare data sets, and draw conclusions.

Back to the Basics Objectives

After completing this workshop, you should be able to:

- Recognize physical and cultural features on topographic maps and on aerial photography
- Determine distance and area measurements
- Calculate scale and scale conversions
- Use traditional technology of map reading skills, distance and scale measurement, and manual GIS (Geographic Information Systems)
- Apply acquired knowledge to other areas of study including geography, mathematics, environmental science, earth sciences, and science
- Introduce inexpensive and traditional mapping and measurement skills and interpretation techniques into your curriculum

Back to the Basics
Albuquerque, New Mexico

Data Sources

Aerial Photography

1996 Albuquerque, NM. U.S. Geological Survey

Topographic Map

A portion of the following map was used for site identification, exercise, and analysis:

1990 1:24,000 scale, Albuquerque West, NM. U.S. Geological Survey Topographic Quadrangle

Materials

1. Back to the Basics exercise: Albuquerque, New Mexico
2. Magnifying glass
3. String
4. Pencil
5. Ruler
6. Paper
7. USGS Topographic Symbols Chart

   (Available as a free download on the Back to the Basics website: *basics.cnlworld.org*)

Back to the Basics
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OVERVIEW: This introductory activity is used to familiarize learners with information found on aerial photographs and topographic maps. The use of symbols on a topographic map and comparative signatures on an aerial photograph introduces feature identification. Placing an aerial photograph and a topographic map of different time periods side by side introduces recognition of change through comparative analysis.

SUBJECT AREA: Geography

GRADE LEVEL: Middle School

STUDENT LEARNING OUTCOMES:
Students will:

- Recognize representative colors and identify symbols used on topographic maps.
- Acquire basic map reading skills including location, distance, area (scale), association, and correlation.
- Identify features on a topographic map and find same features on an aerial photograph.

STANDARDS:

National Geography Standards

Essential Element 1. The World in Spatial Terms

Standard 1: How to use maps and other geographic representations, tools and technologies to acquire, process, and report information from a spatial perspective.

Standard 3: How to analyze the spatial organization of people, places, and environments on Earth's surface.

Essential Element 3. Physical Systems

Standard 1: The physical processes that shape the pattern of Earth's surface.

National Mathematic Standards

Grade Six Mathematics Content Standards

Number Sense

2. Students calculate and solve problems involving addition, subtraction, multiplication, and division.

Mathematical Reasoning

1. Students make decisions about how to approach problems
2. Students use strategies, skills, and concepts in finding solutions

Grade Seven Mathematics Content Standards

Measurement and Geometry

1. Students choose appropriate units to measure and use ratios to convert within and between measurement systems to solve problems.

Mathematical Reasoning

1. Students make decisions about how to approach problems.
2. Students use strategies, skills, and concepts in finding solutions.

National Science Standards

6th Grade Science Content Standards

Investigation and Experimentation

7. Scientific progress is made by asking meaningful questions and conducting careful investigations.

7.f Students will read a topographic map and a geologic map for evidence provided on the maps, and construct and interpret a simple scale map.

CROSS CURRICULAR CONNECTIONS:

Mathematics: Comparing scale
Language Arts: Communication
Art: Development of pattern recognition
Earth Science: Identification of surface features and processes
Environmental Sciences: Use of tools and instruments to conduct scientific activities

TIME: Teacher: 30 minutes for preparation of materials
Class time: one 50 minute class (approximately)

MATERIALS:

Students: 1996 Aerial Photograph, Albuquerque, NM.
1:24,000 scale 1990 Albuquerque West, NM. U.S. Geological Survey Topographic Quadrangles
Magnifying glass; ruler; string; paper; pencil
USGS Topographic Symbols Chart
(Available as a free download on the Back to the Basics website: *basics.cnlworld.org*)

SUGGESTED PROCEDURE:

As the students receive the materials packet, encourage group exploration and quick comparisons. Simple discussion questions should be used to have the students notice the use of colors, symbols, and labeling techniques. Use section 1 for introduction to basic map elements (symbols, colors, and features). Use sections 2 and 3 to identify and locate features on the aerial image and the topographic map. Use section 4 to compare differences between the topographic map and the aerial photograph.

Section 1: ***Introduction to colors, symbols, and scale.***

Ask the students to identify and locate common topographic symbols.

Using the topographic symbols chart and the USGS Topographic Quadrangle:
Blue colored features represent?
Green colored features represent?
Black colored features represent?
Brown colored features represent?

Using the topographic symbols chart:
Identify the symbol for marsh.
Identify symbol for a power line.
Identify symbol for a school.
Identify symbol for a dual highway with median.

On the 1:24,000 scale 1990 Albuquerque West, NM., USGS Topographic Quadrangle
Locate a sandbar.
Locate a benchmark.
Locate a well.
Locate a levee.

Using the 1:24,000 scale 1990 Albuquerque West, NM., USGS Topographic Quadrangle
Find the scale in feet.
Find "0" on the scale. Why are there 1,000 feet to the left and 1,000 feet to the right of "0"?

Using the edge of a piece of paper, determine the distance in feet from the center of the Interstate 40 Bridge to the center of the Barelas Bridge.

What is the straight line distance in feet? _____

Using a piece of string, determine the distance in feet from the Interstate 40 Bridge to the Barelas Bridge. You are in a boat so you must follow the river channel.

What is the distance in feet by boat following the river channel? _____

Section 2: ***Given the following table, first find the object listed on the 1990 Albuquerque West, NM, USGS Topographic Quadrangle and then locate the identified site on the 1996 aerial photograph of Albuquerque, NM.***

Object	*Location*
Old Town Plaza	North, center of map
Downtown Albuquerque	East, center of map
The Rio Grande Zoological Park	Center of map
The Albuquerque Golf Course and Country Club	Center of map

Section 3: ***On the 1996 Aerial Photograph, Albuquerque, NM:***

Find:

a. The roundhouse turntable
b. The drive-in theater
c. The Church on the Old Town Plaza

Determine:

a. What time of day was the aerial photograph taken?

Section 4: ***Compare the 1990 Topographic Quadrangle and 1996 Aerial Photograph of Albuquerque, NM.***

a. Count the number of islands between the Old Town Bridge and the Borelas Bridge on the 1990 topographic map and on the 1996 aerial photograph. What is the difference between the two time periods?

b. Identify any other changes between 1990and 1996.

c. Notice the streets patterns in Albuquerque and identify those areas of Spanish settlement.

Spanish streets are alighted with what feature? _____

e. Notice the street pattern in Downtown Albuquerque.

The downtown Albuquerque streets are alighted with what feature?

_____

f. The streets in the lower right corner of the topographic quadrangle (east of Broadway Blvd. and south of Guadalupe Park) were aligned with the national Township and Range

ASSESSMENT:

1. The instructor will circulate throughout the room questioning each group to establish student mastery of the materials and to troubleshoot and direct student attention to features and objects.
2. If the materials have been laminated, students may label the objects or places in Sections 1-2 using a washable or erasable marker.
3. Student journal entries on the objectives of the activity.
4. After completing the search and locate tasks provided in Sections 1- 4, the student or cooperative group may select other objects or sites to develop peer quizzes.

EXPLORATIONS MAY INCLUDE:

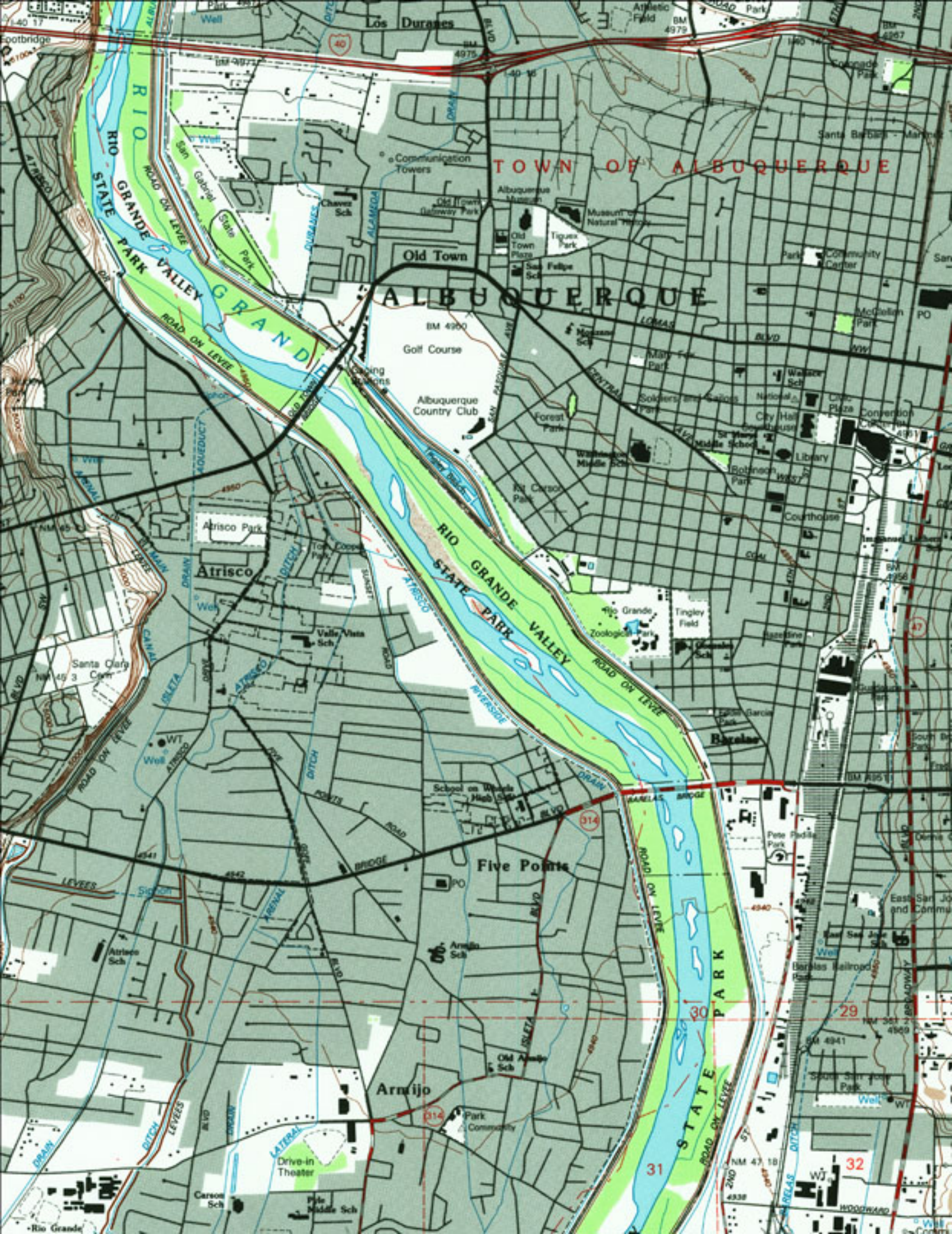
- Packets of local topographic maps and aerial photographs for the students to identify known and unknown sites.
- Student construction of a school topographic map completed to scale and properly oriented.

National Standards References:

Geography Education Standards Project. 1994. *Geography for Life: National Geography Standards*. Washington, DC: National Geographic Research and Exploration.

National Council of Teachers of Mathematics. 2000. *Curriculum and Evaluation Standards for School Mathematics.* Reston, Virginia: National Council of Teachers of Mathematics.

National Research Council. 1997. *National Science Education Standards.* Washington, DC: National Academy Press.



Los Duranes
Footbridge
RIO GRANDE VALLEY STATE PARK
TOWN OF ALBUQUERQUE
Communication Towers
Old Town
ALBUQUERQUE
Golf Course
Albuquerque Country Club
Atrisco Park
Atrisco
Five Points
Armijo
Barelas
Drive-in Theater
Rio Grande