Back to the Basics

Map Reading and Aerial Image Interpretation

Manhattan, New York

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
Manhattan, New York

Data Sources:

Aerial Photography

2010/2011 Manhattan, NY. U.S. Geological Survey

Topographic Map

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

1:24,000 scale, 2010 Brooklyn, NJ/NY; 2011 Central Park, NJ/NY; 2011 Weehawken, NJ/NY; 2011 Jersey City, NJ/NY, U.S. Geological Survey Topographic Quadrangles.

Materials

1. Back to the Basics exercise: Manhattan, New York
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
Manhattan, New York

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, Second Edition

Essential Element: The World in Spatial Terms

Geography Standard 1: How to use maps and other geographic representations, geospatial technologies, and spatial thinking to understand and communicate information.

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

Essential Element: Physical Systems

Geography Standard 7: 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: 2010/2011 Aerial Photograph, Manhattan, NY
1:24,000 scale, 2010 Brooklyn, NJ/NY; 2011 Central Park, NJ/NY; 2011 Weehawken, NJ/NY; 2011 Jersey City, NJ/NY, U.S. Geological Survey Topographic Quadrangles.
Magnifying glass; ruler; string; paper
USGS Topographic symbols chart
(Available as a free download on the Back to the Basics website: *basics.cnlworld.org*)

SUGGESTED PROCEDURE:

As students receive the materials, encourage group exploration and quick comparisons of the aerial photograph and the topographic map. Simple discussion questions should be used to have the students notice the use of colors, symbols, and labeling techniques. Use sections 1 for this task. Use section 2 to compare the aerial photograph with the topographic map. Use section 3 and 4 to locate features on the aerial photograph and to determine time of day.

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, 2010 Brooklyn, NJ/NY; 2011 Central Park, NJ/NY; 2011 Weehawken, NJ/NY; 2011 Jersey City, NJ/NY, U.S. Geological Survey Topographic Quadrangles:
Locate an index contour.
Locate the state boundary between New Jersey and New York.
Locate the following Boroughs and Cities: Brooklyn, Manhattan, Hoboken, and Weehawken.

What is the contour interval on this topographic map? _____

What is the elevation (in feet and in meters) of the hill on Governor's Island?_____

Using the 1: 24,000 scale 2010 Brooklyn, NJ/NY; 2011 Central Park, NJ/NY; 2011 Weehawken, NJ/NY; 2011 Jersey City, NJ/NY, U.S. Geological Survey Topographic Quadrangles:

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 Pier 2 in South Hoboken to Pier 13 on Manhattan Island.

a. What is the straight line distance in feet?_____ In meters? _____

b. Use the string to determine the distance by ferry on the Hudson and East rivers in feet_____; in meters_____.

Section 2: ***Location of features on the topographic map and aerial photograph:***

Place the aerial photograph and the U.S. Geological Survey topographic map side- by- side Given the following table, first find the object listed on the topographic map and then locate the identified site on the aerial photograph.

Object	*Location*
Liberty and Ellis Islands	Southwest quadrant of map
Brooklyn and Manhattan Bridges	South-center of map
Central Park	Top left of map
Railyards at the Hoboken Terminal	Left center of map

Section 3: ***Identify and locate on the 2010/2011 Aerial Photograph, Manhattan, NY***

a. Ships, ferries, and sailboats
b. Cars (can you tell the difference between cars and trucks/buses?)
c. Empire State Building in Midtown
d. Ground Zero

Section 4: ***On the 2010/2011 Aerial Photograph, Manhattan, NY***

a. Looking at the Statue of Liberty, what time of day was the aerial photograph taken?

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 National Implementation (GNIP) Project. 2012. *Geography for Life: National Geography Standards, Second Edition*. Washington, DC: National Council for Geographic Education.

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.

NJ/NY Brooklyn 2010
NJ/NY Jersey City 2011
NJ/NY Weehawken 2011
NJ/NY Central Park 2011

SCALE 1:24 000

1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

CONTOUR INTERVAL 10 FEET

CITY
Palisades Cemetery
Weehawken Cemetery
Union City Post Office
Weehawken
Kings Bluff
Lincoln Tunnel
Hudson River
NEW JERSEY
NEW YORK
Days Point
Pier 98
Pier 97
Pier 95
Pier 94
Pier 92
Pier 90
Pier 88
Pier 86
Pier 83
Pier 81
Pier 76
Pier 72
Pier 64
Pier 62
Pier 61
Pier 60
Pier 59
Pier 58
Pier 57
Pier 56
Pier 54
Pier 53
Pier 51
Pier 49
Pier 48
Pier 46
Pier 45
Pier 42
Pier 40
Pier 34
Pier 32
Pier 26
Pier 25
Union Stock Yard
Penn Central Yard
West Shore Terminal
Pier 99
Amsterdam Houses
Strawberry Fields
Fordham University Lincoln Center Campus
Harbor View Terrace
Columbus Circle
San Juan Hill
Clinton
Hell's Kitchen
Franklin Station Post
Castle Point
Castle Stevens
Thirtieth Street Rail Yards
Uptown Station Hoboken Post Office
Garment District
State University College of Optometry
Parsons Center New School University
Chelsea
Graduate School and University Center City University of New York
Stern College Yeshiva University
Rose Hill
MANHATTAN
Kips Bay
Madison Square Station New York Post Office
Peter Cooper Village
Midtown Skyport
New York Incorporated Seaplane
Stuyvesant Town
Cooper Station New York Post Office
Bookseller's Row
Vanderbilt Law School New York University
New York University
East Village
Jacob Riis Houses
New York City Marble Cemetery
Loisaida
Soho
Little Italy
Chinatown
Lower East Side
Bloody Angle
Hillman Housing
East River Houses
Corlears Hook
Williamsburg Bridge
University Neighborhood High School
Pier 36
Pier 35
Titanic Memorial Lighthouse
Manhattan Bridge
Brooklyn Bridge
Vinegar Hill
Dry Dock Number 1
Brooklyn Heights
Downtown Station Brooklyn Post Office
Long Island University Brooklyn Campus
East River
HOBOKEN
West Side Station Hoboken Post Office
Washington Street Station Hoboken Post Office
Pier 8
Pier 7
Pier C
Pier B
Pier A
Main Station Hoboken Post Office
Hoboken Terminal
Pier 1
Pier 3
Pier 2
Pier 4
Pier 5
Pier 6
Pier 9
Pier 10
Holland Tunnel
University of Phoenix Jersey City Campus
Pier M
Pier L
Pier K
Pier H
Pier F
Pier D
Pier C
Pier B
Hudson River
NEW JERSEY
NEW YORK
West Village Houses
Greenwich Village
Tribeca
NEW YORK
Saint Paul's Churchyard
Pace University
Battery Park City
Trinity Place Bridge
Trinity Churchyard
Titanic Memorial Lighthouse
The Battery
Staten Island Ferry Terminal
Morris Canal Basin
Pier G
Pier E
Pier D
Pier B
Pier C
Pier A
Pier 2
HUDSON CO
NEW YORK CO
Ellis Island
Liberty Island
Hudson River
Dimond Reef
Brooklyn-Battery Tunnel
Castle William Light
Governors Island Ferry Landing
Governors Island
Yankee
Pier 16
Pier 15
Pier 14
Pier 13
Pier 11
Pier 9
Pier 6
Pier 1
Pier 2
Pier 3
Pier 4
Pier 5
Pier 6
Pier 7
Pier 8
Pier 9A
Pier 9B