The Geomatics Academy
Student Handout

**Activity Day 1: The Local Environment and its Impact on
the Health of the Chesapeake Bay; Writing Résumés**

Staff:
- Dr. Linda Cooper
- Dr. Martin Roberge
- Ms. Ameerah Bello
- Dr. Jay Morgan
- Dr. "Bee" Thebpanya,
- Dr. Ming Tomayko;

General Schedule:

8:15	students arrive and start eating breakfast; informal introductions
9:00	Welcome, formal introductions, description of the day's activities, talk on the watershed and how it is linked to the environment; separate into 4 groups
9:30	Walk to the park
10:00	Start workstations: 90 minutes; 4 stations, 20 minutes each, +10 minutes extra
11:40	End workstations; walk back
12:00	Lunch
12:30	Presentation on Resume writing; Environmental careers
1:00	End of day

Station A. Urban Heat Island workstation: (Thebpanya)
UHI Background:
- Urban areas tend to be warmer than rural areas.
- This could be explained by the low albedo of urban asphalt and dark-colored roofs:
  - Low albedo (dark colors), such as asphalt, will absorb more sunlight.
  - High albedo (light colors) will reflect more sunlight.
- This could be explained by the lower evaporation from urban pavement:
  - Moist surfaces (like grass or trees) will use energy to evaporate and will be cool.
  - Dry surfaces (like pavement) will use energy to get warmer.

Station B. Global Positioning Systems: (Morgan)

Station C. Water Quality: (Roberge)

Station D. Water Velocity and Discharge: (Cooper)

After Lunch: Resumes (Tomayko)

A

The Urban Heat Island

Group Members:_____

Date:_____ Time:_____ Weather Conditions:_____ Air temp:____ °F

Description of Surface Type	Reflected light ↑ (lux)	Total Sunlight ↓ (lux)	Albedo (%)	Temperature (°F)

Albedo is the amount of sunlight that an object reflects. An object that reflects half of the light that strikes it has an albedo of 50%. An object that reflects all of the light has an albedo of 100%. What color would a surface be if it had an albedo of 0%?
We'll use a light meter to measure the amount of sunlight that shines on an object,   (A:)
 and then again to measure the amount of light that reflects off of the object.

Temperature is a measure of how much energy an object has absorbed.
We'll be using an Infrared Thermometer to measure the temperature of different surfaces.

$$\% \ Albedo = \frac{Reflected \ light}{Total \ sunlight} \times 100\%$$

Global Positioning Systems:

Measuring the Earth's circumference

Set up: Each red point on the airphoto is 100m (0.1 km) from the other. Start from the south point, (P1) near the curb, adjacent to the speed hump, and then measure the northern point (P2).

Date:

Time:

Group Members:

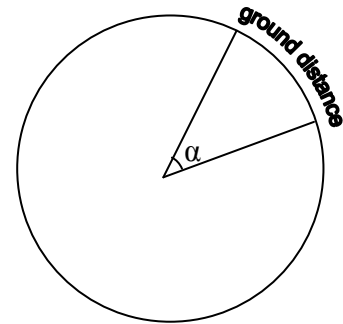|	Latitude *(decimal degrees)*	Longitude
P2:		
P1:		
Diff:		

P2:		
P1		
Diff:		

Equations:

$$\frac{0.100\text{km}}{\Delta latitude} = \frac{\alpha}{360°}$$

$$Error = \frac{measured - actual}{actual}$$

Earth's Circumference
pole-pole: 39,911 km
equator: 40,074 km

Distance between Fairmount Heights and San Francisco: ~4,000km

Water Quality:
Lower Beaverdam Creek and the Chesapeake Bay

Watersheds:

For every point along a stream or river, there is a corresponding watershed, which includes all of the land that drains into the stream. As you travel downstream, the watershed becomes larger.
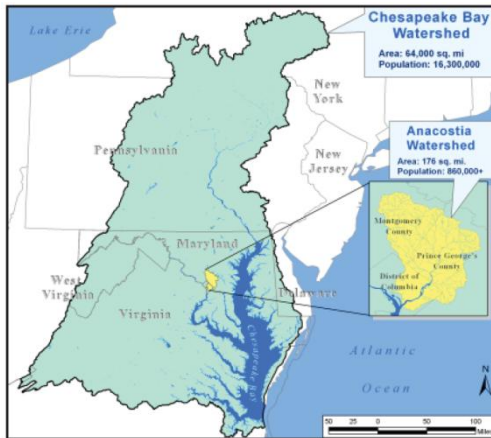
*The Anacostia watershed is a subwatershed of the Chesapeake Bay watershed.*

Watersheds:

Fairmount Heights Neighborhood
↓
Lower Beaverdam Creek
↓
Anacostia River
↓
Potomac River
↓
Chesapeake Bay
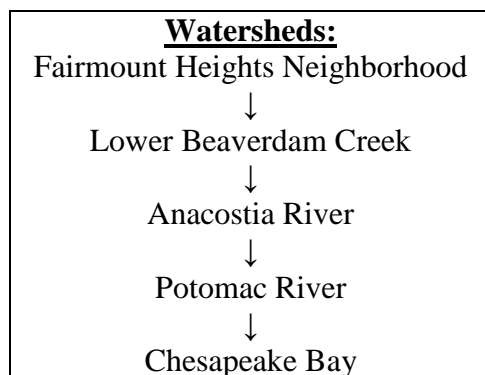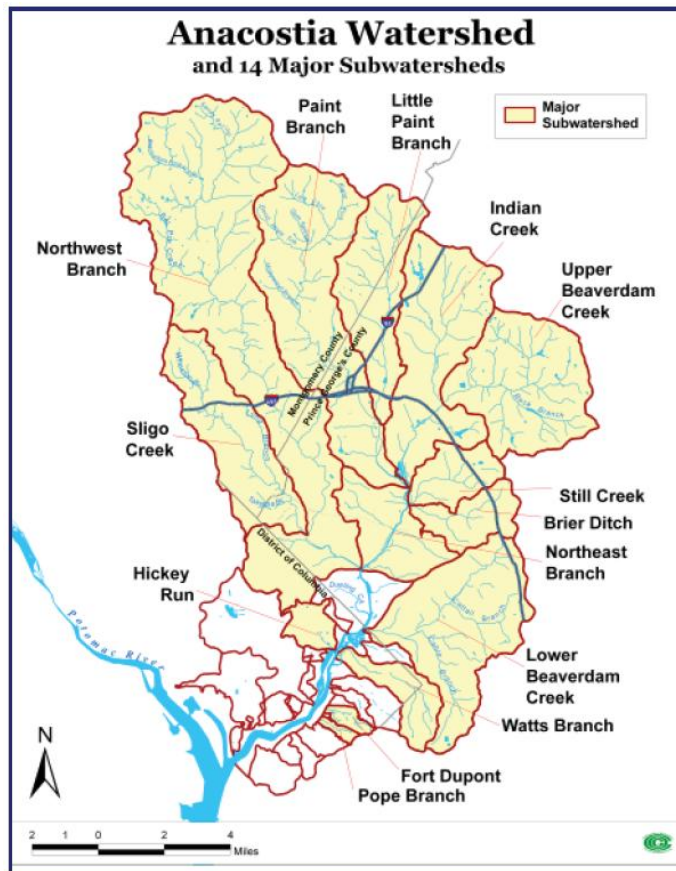
Water Quality:

Conductivity is the ability of water to conduct electricity. The more stuff that is dissolved in the water, the better that it can conduct electricity. We use conductivity as a general indicator of when there has been a sudden increase in dissolved pollutants.

Dissolved Oxygen is needed by insects and fish to survive. Healthy streams dissolve oxygen as they spill down riffles in the stream, and receive it from aquatic vegetation. Water will lose oxygen as it gets warmer, or when too much organic material (such as from a sewage spill) decays in the water.
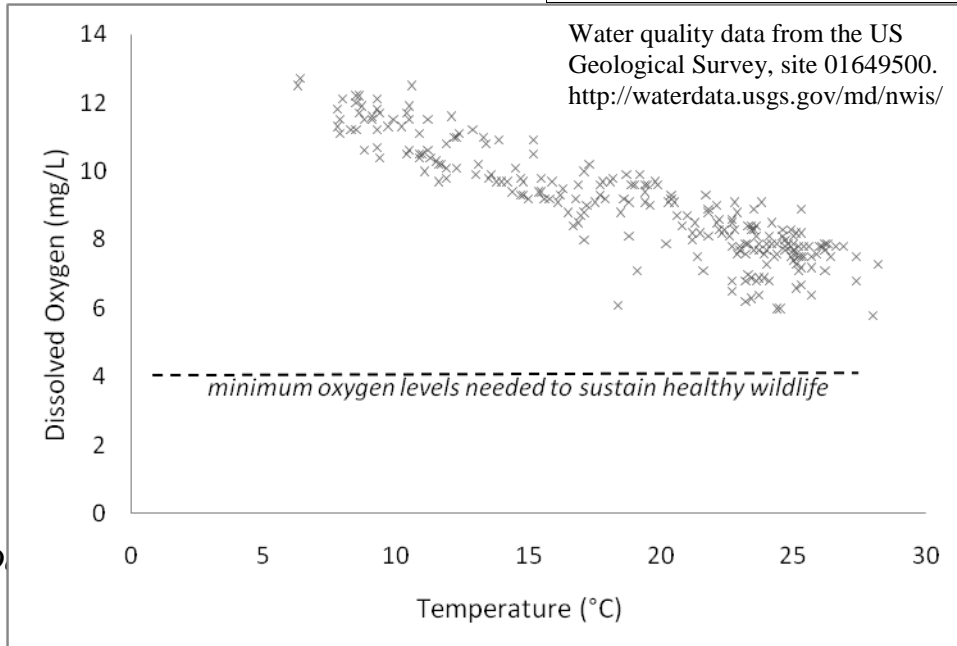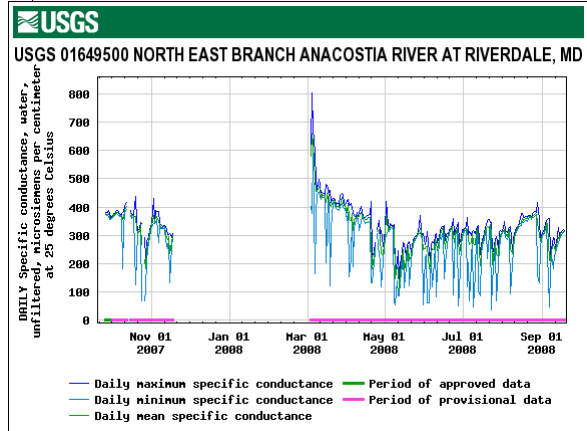
Maps from: Metropolitan Washington Council of Governments. 2007. Anacostia River Watershed: Environmental Condition and Restoration Overview. http://www.anacostia.net/download/Summit/1_AnacostiaOverview.pdf

Figure 6. Tributary and Tidal River Shoreline Trash Survey Data, 2003 - 2006
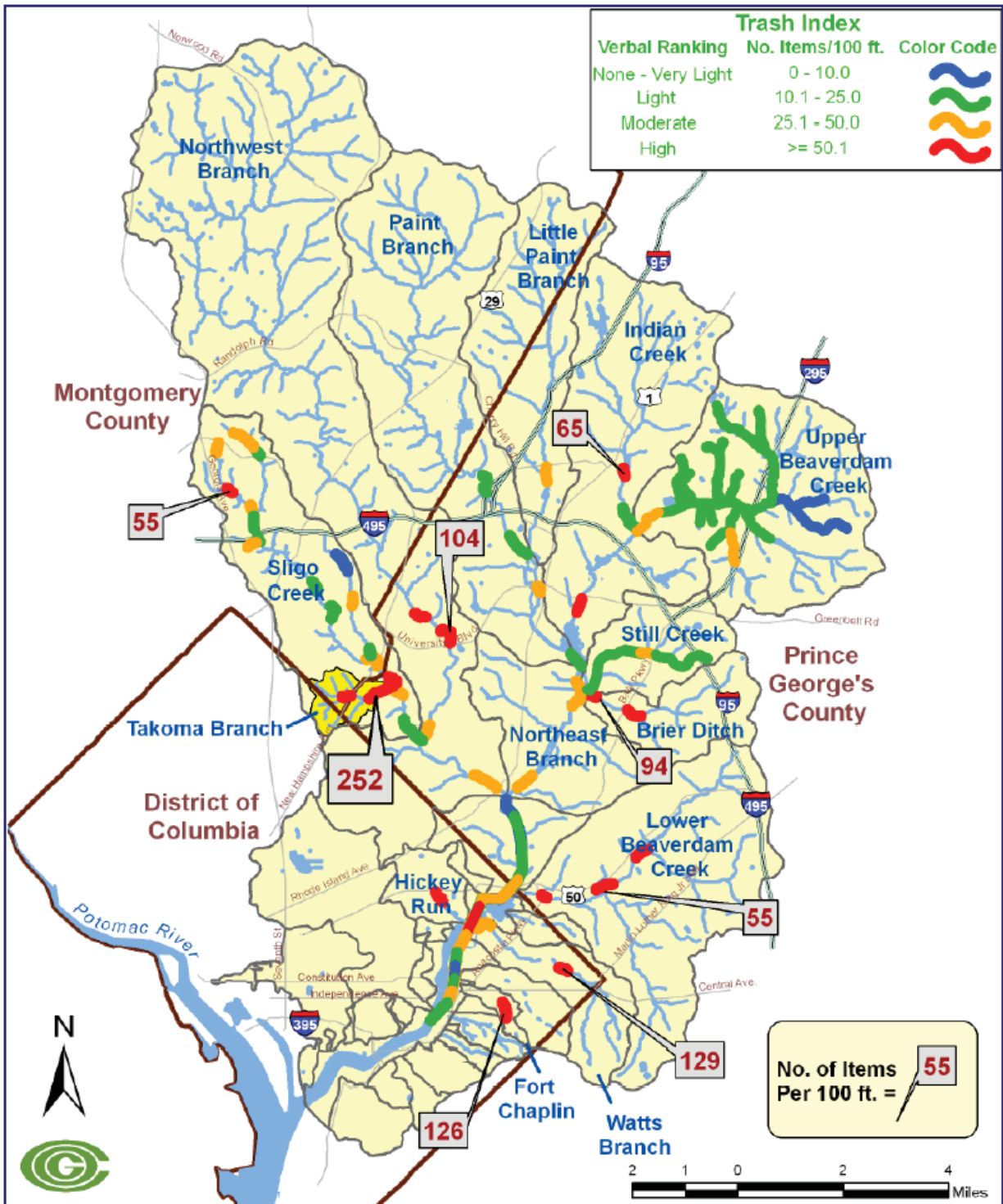
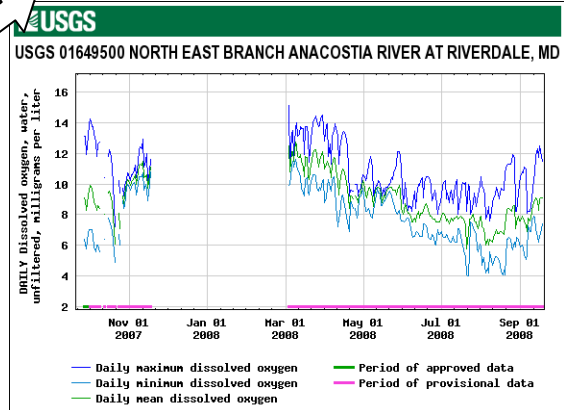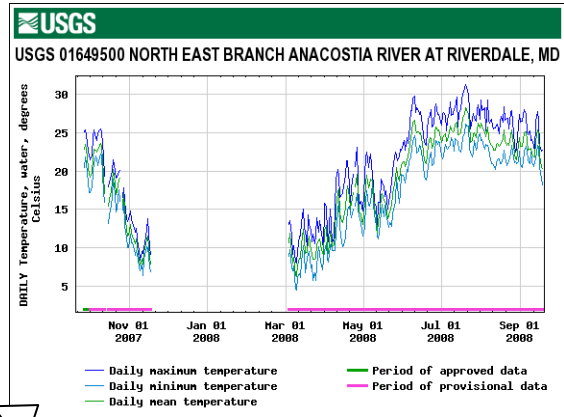

Map from: Metropolitan Washington Council of Governments. 2007. Anacostia River Watershed: Environmental Condition and Restoration Overview. http://www.anacostia.net/download/Summit/1_AnacostiaOverview.pdf

Our measurements for Beaverdam Creek	
Date: *(dd/mm/year)*	
Time: *(hours)*	
Temperature: *(°C)*	
Dissolved Oxygen: *(mg/L)*	
Conductivity: *(uS/cm)*	

USGS 01649500 NORTH EAST BRANCH ANACOSTIA RIVER AT RIVERDALE, MD

Measurements from the Anacostia at Riverdale, MD		
Date	Temp. (°C)	D.O. (mg/L)
9/9/2008	23.0	7.7
9/10/2008	22.2	8.3
9/11/2008	21.8	8.8
9/12/2008	21.8	8.9
9/13/2008	23.8	9.1
9/14/2008	25.3	8.9
9/15/2008	24.9	8.3
9/16/2008	22.1	9
9/17/2008	20.5	9.1
9/18/2008	20.3	9.1

USGS 01649500 NORTH EAST BRANCH ANACOSTIA RIVER AT RIVERDALE, MD

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Water quality data from the US Geological Survey, site 01649500. http://waterdata.usgs.gov/md/nwis/

minimum oxygen levels needed to sustain healthy wildlife

D

Measuring Stream Discharge

Date: Time: Group Members:

Location of cross-section:

i	depth (m)	width (m)	velocity (m/s)	discharge (m^3/s)	comments
0					
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Sum of all segments:

$$Discharge\ of\ a\ stream\ segment = Velocity \times Area\ of\ segment$$

$$Total\ Discharge = \sum_{i=0,1...n}^{n} Width_i \times Depth_i \times Velocity_i$$
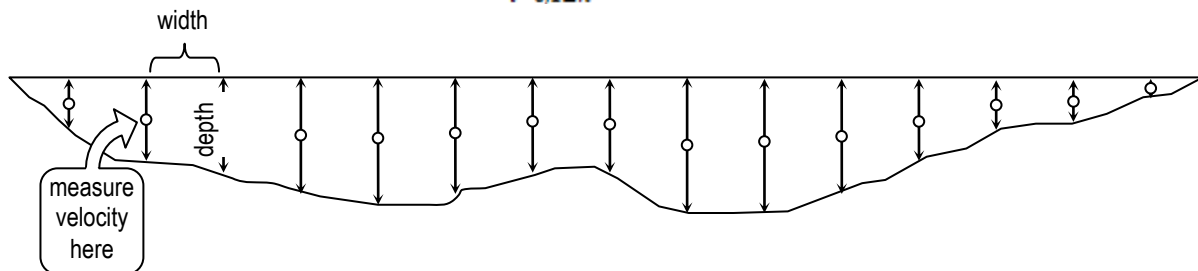
Resume Worksheet

Name: _____

I. Personal Information

Address: _____

City: _____ State: _____ Zip: _____

Phone: (_____) _____ E-Mail: _____

II. Education

High School Attended: _____

Location: _____ State: _____

Anticipated Graduation Date: _____

Other Training: _____

Location: _____ State: _____

Date Completed: _____

Awards and Honors

_____

_____

III. Activities

1. School or Outside Activities (clubs, sports, etc.)

_____

_____

2. Community Service

_____

_____

IV. Experience Information

Position title: _____

Organization name: _____

Address: _____

City: _____ State: _____

Dates employed (months & years only) From: _____ To: _____

Name of supervisor(s): _____

Duties and responsibilities: _____

_____

Quality attributes you found important and used successfully in this position.

_____

_____

Specific performance accomplishments or contributions you made to this job:

_____

_____

Combine the duties, qualities and accomplishments together and write a strong job description:

_____

_____

V. Special Competencies

(Include your special talents, skills, training, languages)

_____

_____

_____

_____

VI. Personal References

(Teachers, employers, activity leaders, coaches, ministers)

1. Name: _____ Phone: (_____) _____

    Address: _____ City: _____ State: _____

    Position: _____

2. Name: _____ Phone: (_____) _____

    Address: _____ City: _____ State: _____

    Position: _____

3. Name: _____ Phone: (_____) _____

    Address: _____ City: _____ State: _____

    Position: _____