

EXPERIMENTS

A Crosstown Walk to Assess Environmental Changes Along an Urban Socioeconomic Gradient

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Students on the Street
Surveying Neighborhood
Photo by Bruce Grant

Table of Contents:

ABSTRACT AND KEYWORD DESCRIPTORS.....	2
SYNOPSIS OF THE LAB ACTIVITY.....	4
DESCRIPTION OF THE EXPERIMENT	
Introduction.....	6
Materials and Methods.....	7
Questions for Further Thought and Discussion.....	10
References and Links.....	11
Tools for Assessment of Student Learning Outcomes.....	12
Tools for Formative Evaluation of This Experiment.....	18
NOTES TO FACULTY.....	19
STUDENT COLLECTED DATA.....	21
ACKNOWLEDGMENTS, COPYRIGHT AND DISCLAIMER.....	25

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ABSTRACT

This exercise focuses on determining environmental and quality of life differences along a cross-town transect spanning a socioeconomic gradient in a city (for example, we use a transect that runs along T Street, Washington, DC, spanning approximately 25 blocks from 4th Street (LeDroit Park) NE to 20th Street NW (Dupont Circle)). Data collected along this transect allow students to examine relationships of demographic factors (economic, social, etc.) to environmental quality. While ecological and environment studies have traditionally focused on measurements of species distribution and abundance, this exercise places those measurements with an anthropogenic context and relates environmental conditions to issues of public health and safety. [Lab periods: 1-3; Outside activities: transect establishment, ecological and social assessment, vegetation sampling, bird counts; Inside activities: data management, analysis, and presentation]

KEYWORD DESCRIPTORS

- **Principal Ecological Question Addressed:** How can humans drive ecological processes that result in variation among communities? How does environmental variation affect human communities? Both questions focus on the interaction between humans and their environment, but from alternative viewpoints. We consider it critical that students recognize that understanding urban ecosystems requires looking at the system from both perspectives.
- **Ecological Topic Keywords:** anthropogenic, community ecology, ecosystem services, environmental justice, gradient analysis, population ecology, urban ecology, urban ecosystems, urban wildlife conservation
- **Science Methodological Skills Developed:** field work, hypothesis generation and testing, statistics, graphics, data analysis, scientific writing, oral research presentations
- **Pedagogical Methods Used:** student-directed inquiry, cooperative learning, problem-based learning, scoring rubrics

CLASS TIME

One to three lab periods (3 to 6 hours of class time) depending on amount of time instructor wishes to spend on assignment

OUTSIDE OF CLASS TIME

Six to 12 hours, based on two hours of data analysis and report preparation for each hour of class time

STUDENT PRODUCTS

1. Proposal presentation in which student groups present their hypothesis and design for suggestions and criticism (alternatively, groups can prepare a written proposal),
2. A presentation which may be fairly sophisticated, e.g., PowerPoint, or less so, and
3. A paper or two (ranging between 5-10 pages in total length, including figures, tables, and bibliography).

SETTING

The ideal setting is a single, long street that runs through two or more neighborhoods or communities that differ from one another historically, ethnically, or socioeconomically within an urban setting.

COURSE CONTEXT

We have used this experiment in an environmental studies class and a general ecology class at Howard University, a non-majors natural resource conservation class and a course for wildlife conservation majors at the University of Missouri-Columbia. We ask students to do the work in groups of three to five students for classes with lab sections of 20 to 30 students.

INSTITUTION

Howard University and University of Missouri-Columbia are public research 1 universities. The lab is taught in a biology department at Howard and in a fisheries and wildlife department at Missouri.

TRANSFERABILITY

This exercise is extraordinarily transferable. It is not restricted to major metropolitan areas. While we have conducted transects in Washington, DC across historically-segregated communities and in Columbia, MO across communities that differ socio-economically, a colleague has compared “town-gown” communities (student housing vs. a upscale, white-collar neighborhood) in a much less metropolitan city (East Lansing, MI) and we have conducted transects in even smaller “towns.” The exercise is not limited to Ecology courses; we have used it in a variety of courses, including intro- and upper-level major courses, and even non-major courses. The exercise and products can be changed to reflect class size, level, and focus.

SYNOPSIS OF THE EXPERIMENT

What Happens

We divide the class into groups of 4-5 with each student assigned a responsibility (recorder, reporter, etc.). The groups then walk the transect, observing environmental, ecological, and socioeconomic differences. They do not collect data at this time, but take notes allowing them to describe the qualitative differences they observed. At the end of the transect, each group makes a short (1-2 min) presentation of their observations and then develops one or more hypotheses about the environmental differences. On a return trip, student groups collect data. When we extend this exercise over multiple periods, we have the groups prepare a short paper describing their observations and outlining the methods they plan to use for data collection and analysis during the subsequent lab periods.

Lab Objectives

This lab has five objectives:

1. Students will understand that socioeconomic gradients are a form of ecological gradient.
2. Students will understand how social, economic, and historical factors shape the ecology of urban neighborhoods.
3. Students will understand the relationship between the environmental issues in urban neighborhoods and the ecological characteristics of these neighborhoods.
4. Students will develop an understanding that ecological approaches can be used to examine environmental issues particularly those in cities that are often ignored by ecologists.
5. Student will understand that there is not a single, correct way to do science.

These objectives are achieved through this lab by having students develop a wide variety of hypotheses linking environmental differences to social, economic, and historical factors. For instance, one group hypothesized that owner-occupation would be positively associated with quality green-space, including tree size, garden condition, and maintenance of public green-space areas, including tree boxes. Research by another group revealed substantial differences in tree size among neighborhoods, particularly related to property value. Yet another group hypothesized that neighborhood socioeconomic condition would correlate directly with the numbers of trees, understory vegetation density, and bird diversity.

Equipment/Logistics Required

Required materials are limited to notebook and pen. Depending on what the group decides to investigate, and the schedule used for the exercise, other materials may be used. For instance, students have investigated tree size (DBH tape), insect diversity (trowels and paper cup pitfall traps), ground cover (sampling frame), etc. As you may have already noticed, there is a great deal of flexibility in how this exercise can be structured—and that is really only determined by your limits and student interest.

Summary of What is Due

1. Proposal — Student groups are assessed on either an oral or written presentation of their hypothesis and investigative design.
2. Oral presentation — Each group is evaluated on the analysis and interpretation of data as presented to the class in a PowerPoint format.
3. Paper(s) — The results of each group's study is assessed based on one or two papers (ranging between 5-10 pages in total length), including figures, tables, and bibliography. Papers are formatted following standard journal style.

DESCRIPTION OF THE EXPERIMENT

Introduction (written for students)

In today's lab exercise you will conduct a transect, to observe changes in density and abundance of populations, factors, and/or conditions along a socioeconomic gradient in an urban ecosystem. Your transect data will be used to develop an understanding of how environmental conditions vary across city neighborhoods and the relationship between social, economic, and cultural factors and environmental conditions.

As you walk along the street please observe variation in environmental conditions.

These might include, but are not limited by any means to:

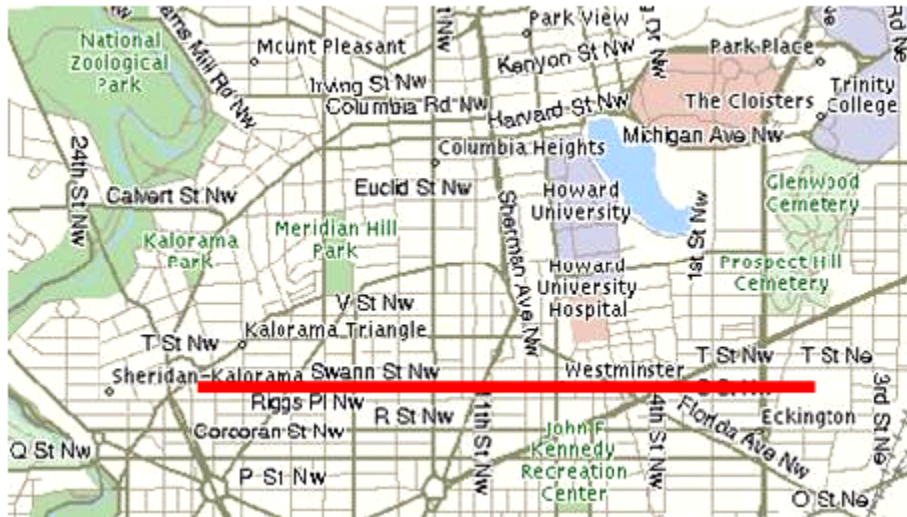
- building condition — abandoned, occupied but in need of repair, litter and graffiti, good to excellent
- building type — house, condominium, apartment, ground floor convenience store (note with or without liquor license)
- building density — single family, multiple family, apartment
- block condition — neat and well ordered, generally neat but occasional untidiness, unclean, hazardous
- vegetation — large old trees, small trees, garden (more details can be provided, e.g. species, DBH, etc.);
- safety — street lights present, house/apartment lights present, security signs, etc.

Using this information, you will develop a description of:

1. The neighborhood — This should be a kind of "guidebook" to the transect in which you provide a description of what a visitor might expect to see and look for, including any key landmarks and sights—as well as any historical, socio-economic, and cultural differences along the transect.
2. How the environmental conditions vary spatially along this transect. This section should include a description of:
 - a. any environmental problems that you identified,
 - b. the local residents you observed,
 - c. the likely impact of environmental conditions on residents,
 - d. if there is a need for public policy to address any of the environmental problems,
 - e. the stakeholders and groups likely to be involved in the public, decision-making process, and
 - f. the role of ecological research data in informing and guiding the decision-making process.

Materials and Methods (written for faculty)

Study Site(s):



The transect runs just south of the Howard University campus, along T Street, Washington, DC for approximately 25 blocks from 4th Street (LeDroit Park) NE to 20th Street NW (Dupont Circle). (Map from MapQuest)

The ends of the transect are in two socio-economically, culturally, and racially distinct communities. LeDroit Park, on the east, was created in the late 1800s as an exclusively European-American neighborhood. In the 1940s, it became a mixed middle-class African-American neighborhood, especially following the abolition of racial covenants (legal restrictions that racially restrict the sale of property and that had prevented black residents from owning houses in some neighborhoods). Currently, the area is in a state of flux and while it remains largely African-American, there has been an increase in the number of economically advantaged and non-African-American residents. Dupont Circle, on the western end, began as a racially mixed neighborhood of many upper class African-Americans and European immigrants, although African-American residents were restricted to the northeast section of the Dupont Circle area. Over time, the area has become majority European-American neighborhood.



The Columbia, MO transect runs follows Garth Avenue for a similar distance from the its start in the Old Stewart Road neighborhood, an upper income predominately European-American neighborhood, to the intersection of Garth and Business 63 in the Ridgeway neighborhood, a lower income neighborhood dominated by rental housing and a mix of European-American and African-American residents. (Map from MapQuest)

Overview of Data Collection and Analysis Methods:

1. **Single lab period format:** The class is divided into groups of 4-5 with each student assigned a responsibility (recorder, reporter, etc.). We leave the classroom, walk to the east end of the transect along T Street. Along the way the instructor joins up with each of the groups to see what observations they are making, provide input, and answer any questions they might have. The groups do not collect data at this time, but take notes. When we reach the end of the transect (usually about 12 blocks, although this varies according to time), each group discusses their observations and decides on the type and method for data collection on the return trip back to the starting point. Each group then makes a short (2-3 min) presentation to the other students. While we do this very informally, standing on the sidewalk, students are expected to provide suggestions to improve data collection and analysis. Alternative approaches could involve 1) pairing groups for discussions, exchanges, and suggestions and 2) pairing groups and asking each to report the other group's methods (an interesting twist suggested by a reviewer that would demand clear presentation and understanding). Following the return walk with data collection, each group writes a short (~5 page) paper in which they present their hypothesis, a summary and analysis of their data, and draw appropriate conclusions.
2. While this exercise can be done in a single week, we have found a multi-week format to be more satisfying.

- **Week 1:** In this version, student groups make notes on both directions of the walk and then meet back in the lab for short discussions and presentations (see “Single lab period format” above for a general description). We then have them locate appropriate literature concerning urban ecology and write a short paper in which they develop their hypotheses about the environmental differences and propose methods to test the hypotheses, e.g., what data will be collected and how it will be analyzed.
- **Week 2:** Groups walk the transect (either during the “lab” period or independently), collecting data in a more ecologically and environmentally focused manner. Examples of typical group data includes: 1) identification, measurement, and determination of the condition of street trees, 2) estimation of bird or insect biodiversity, and 3) determination of the amount and types of greenspaces (tree boxes, lawns, schoolyards, and parks). Given differences in group foci, we have found it advantageous to allow them to schedule their walks in Week 2 independently of the lab period.
- **Week 3:** We meet in the regular lab period for group discussions of data and analysis. At the end of the period each group makes a short (~10 min) presentation of the literature they have located, along with their data, analysis, and results. Members of the other groups are expected to provide constructive criticism.
- **Week 4:** Following 15 min, group presentations to the class (PowerPoint is the standard method), the groups submit their papers which (because of the greater time and emphasis on the exercise) are generally 0-15 pages. These follow standard scientific research paper format (e.g., abstract, introduction, methods, results, discussion, and bibliography) and because students have been exposed to the format in earlier exercises, our expectations are fairly high and the grading is rigorous.

Report Format

Regardless of whether the exercise follows a single or multi-week format, all students participate in the writing of a group, research-style paper. We discuss with the students what should and should not be included in each section and provide handouts (or post information online) on how to write scientific research papers. We encourage the students to write the paper using guidelines for peer-reviewed journals and have found the guidelines for “From the Field” submissions to *Wildlife Society Bulletin* (<http://www.wildlife.org/publications/bulletinguidelines.pdf>) to be particularly helpful because of the emphasis on communicating ideas and concepts in a short paper format. The students are required to work collaboratively on the papers and to evaluate one another’s contributions to the group product (see rubric below). We encourage student editing of papers prior to submission noting that this increases the paper quality and reduces instructor workload (Gass 2002).

Student group research papers are structured according to the following criteria:

- **Abstract:** This section includes both the ecological and environmental context as to why this study would be of interest and important to ecologists and others. We expect students to state the specific questions that their study addresses, provide a summary of the methods used, state and summarize their results (using figures and tables where appropriate), and draw appropriate conclusions from their data.
- **Introduction:** In this section the group is expected to provide an environmental and ecological context, including historical, political, and economic information pertinent to the transect, cite other relevant studies and findings, and state the specific questions that they address (2-3 pages).
- **Methods:** Groups must provide sufficient detail so that study could be repeated—without making it tedious to read (1 page).
- **Results:** Here, groups must clearly state the results succinctly, using appropriately labeled and designed tables and figures (1-2 pages).
- **Discussion:** Groups must provide a short summary of their overall results, an interpretation of results, and a comparison with other studies. If necessary, groups should also present a discussion of limitations of the study and suggestions for follow-up studies (3-5 pages).
- **Bibliography:** All references cited in the text must be included here, formatted according to that used in Wildlife Society Bulletin, 5-10 references are expected.

Questions for Further Thought and Discussion

We have found the following questions useful during the walk:

1. What have you noticed about the conditions of the sidewalk, tree boxes, yards, lawns, and houses as you've walked along the transect?
2. What differences have you observed concerning the residents along the transect?
3. What do you know about the history of the neighborhood through which we are walking? Students often know much more than you think about the area!
4. Have you noticed any security signs posted in front of the houses? Are there differences in the number of mailboxes associated with each house?
5. Have you noticed any variation in the species of trees planted in the tree boxes?
6. If there are gardens, you can ask the groups about variety of species planted.

Each question invariably leads into a follow-up discussion. For instance, environmental observations regarding mailboxes may lead to consideration of the numbers of residents per unit, and whether the residence should be classified as serving unrelated individuals, a single-family, or a multiple family unit. This may then lead to consideration

of neighborhood population demographics, then to whether or not residents are owners or renters, and then to issues of civic responsibility. Be aware that not all aspects of the discussion may be comfortable!

At the completion of the group presentations we ask the class to describe the environmental differences they observed and whether these are related in any way to neighborhood differences. If they note differential impacts of environmental conditions on local residents (and they should have since you located the transect so that they would), ask them to posit how public policy could be developed to address environmental problems, the stakeholders, and groups likely to be involved in the process, and the role of ecology in informing the decision-making process.

References and Links

(Note: To facilitate student understanding of the urban environment we usually provide some basic references. This list includes examples for a variety of cities, but you may wish to locate more specific, appropriate, relevant references for your city.)

- Baltimore Ecosystem Study Long-term Ecological Research Project (<http://beslter.org>)
- Berlin Digital Environmental Atlas (http://www.stadtentwicklung.berlin.de/umwelt/umweltatlas/edua_index.shtml)
- Bullard, R., G.S. Johnson, and A.O. Torres. 2000. *Sprawl City: Race, Politics, and Planning in Atlanta*. Island Press, DC. 236 pp.
- Central Arizona—Phoenix Long-term Ecological Research Project (<http://caplter.asu.edu>)
- Cronon, W. 1995. *Uncommon Ground: Toward Reinventing Nature*. W. W. Norton.
- East St. Louis Action Research Project (<http://www.eslarp.uiuc.edu>)
- Forgey, B. 1999. How 1902's City of Tomorrow Became the Capital of Today. *Washington Post*, January 4; A1.
- Gass, C.L. 2002. *An exercise in thinking, writing, and rewriting. Great Ideas in Teaching*. Benjamin Cummings.
- Gonzalez, A., J.H. Lawton, F.S. Gilbert, T.M. Blackburn and I. Evans-Freke. 1998. Metapopulation dynamics, abundance, and distribution in a microecosystem. *Science* 281:2045-47.
- Katz, B and J. Bradley. 1999. Divided We Sprawl. *Atlantic Monthly*, December 1999.
- Middendorf, G. and B. Grant. 2003. The challenge of environmental justice. *Frontiers in Ecology and the Environment* 1(3): 154-55.

- National Park Service. 2004. LeDroit Park Historic District. (<http://www.cr.nps.gov/nr/travel/wash/dc65.htm>)
- Nilon, C.H. and G.S. Huckstep. 1998. Analysis of Chicago River recreation habitats. Pages 161-172 in P.H. Gobster and L.M. Westphal, eds. *People and the river: perception and use of Chicago waterways for recreation*. USDI National Park Service, River, Trails and Conservation Assistance Program. Milwaukee, WI. (<http://ncrs.fs.fed.us/pubs/misc/chicagoriver/people/pdf/ch5.pdf>)
- Nilon, C. and S. Huckstep. 1998. Impacts of site disturbance on the small mammal fauna of urban woodlands. Pages 623-627 in J. Brueste, H. Feldmann, and O. Uhlmann, eds. *Urban Ecology*. Springer-Verlag, Berlin.
- Schmid, J. 1975. Urban vegetation: a review and Chicago Case Study. Department of Geography Research Paper No. 161. University of Chicago, Chicago.
- Stilgoe, John R. 1988. *Borderland: Origins of the American Suburb, 1820-1939*. Yale University Press, New Haven, 353 pp.
- West Philadelphia Landscape Project
<http://web.mit.edu/wplp/>
- Wiens, J.A. 1997. Metapopulation dynamics and landscape ecology, pp. 43-62. In *Metapopulation Biology: Ecology, Genetics, and Evolution*, I. Hanski and M.E. Gilpin (eds.), Academic Press, San Diego. 512 pp.
- Williams, P. K. 2002. Greater U Street. In *The Historical Society of Washington, DC's Guide to Neighborhood Resources*. Pp. 45-95. Accessed on April 6, 2004 at (www.citymuseumdc.org/pdf/GuideToNeighborhoodResources.pdf)

Tools for Assessment of Student Learning Outcomes

We use the following two rubrics for assessing group performance and student contribution to the group effort. We like to ask students to assess group performance at all stages of the exercise so that we can identify issues before they become problems. We do not use it to differentially distribute credit for grading! The third tool provided is a questionnaire which we have developed to provide some information concerning the student background and to assess attitude changes. Both parts should be administered prior to the exercise and, at some point following completion, Part B should be administered.

CROSSTOWN WALK – GROUP PERFORMANCE**GROUP:** _____**PUNCTUALITY:**

If late (-2.5 [10%] per day) _____

STRUCTURE, FORMAT & CONTENT (20 max):

Typed and formatted appropriately - (0-3) _____

Margins and font appropriate, pages numbered (3)

Either margins or font appropriate or pages unnumbered (2)

Two of three inappropriate (1)

Entirely inappropriate (0)

Abstract - (0-5) _____

Complete and clear description (4-5)

Incomplete, but reasonably clear (2-3)

Incomplete and unclear (1)

Missing (0)

Introduction (including hypotheses, both (null and alternative) (0-5) _____

Introduction complete with reasonable hypothesis (4-5)

Incomplete or unreasonable hypothesis (2-3)

Incomplete and unreasonable hypothesis (1)

Missing (0)

Methods - (0-5) _____

Complete and clear description (4-5)

Incomplete, but reasonably clear (2-3)

Incomplete and unclear (1)

Missing (0)

Results (including submission of electronic copy of data) - (0-5) _____

Complete and clearly organized (4-5)

Incomplete, but reasonably clearly organized (2-3)

Incomplete and not clearly organized (1)

Missing (0)

Table presenting descriptive statistics for each group (0-3) _____

Complete and correct table (3)

Incomplete or incorrect table (2)

Incomplete and incorrect table (1)

Missing (0)

Figure and/or histograms (0-3) _____

 Figure neat, complete, understandable, with appropriate
 descriptors, and entitled and labeled appropriately (3)

Figure missing two or more of the above criteria (2)

Figure missing three or more of the above criteria (1)

Missing (0)

Statistical analysis (0-3) _____
 Complete and correct analysis (3)
 Incomplete or incorrect analysis (2)
 Incomplete and incorrect analysis (1)
 Missing (0)

Discussion - (0-10) _____
 Complete and clear description and interpretation of the
 results, including statistical analysis and incorporation
 of other studies (9-10)
 Missing either description, interpretation, stats, or
 incorporation (7-8)
 Missing two of these, but otherwise written (5-6)
 Missing three, but otherwise written (3-4)
 Missing four and/or poorly written (1-2)
 Not provided (0)

Bibliographic reference (insert # required here) - (0-5) _____
 References from reputable scientific journals, appropriate
 to the topic and formatted correctly (4-5)
 Reference not from a reputable scientific, not appropriate
 to the topic, or not correctly formatted (2-3)
 Reference not a reputable scientific journal, not
 appropriate to the topic, and not correctly formatted (1)
 Missing (0)

WRITING (5 max):

Writing style and grammar - (0-3) _____
 Well-written (3)
 Moderately well-written (2)
 Poorly written (0)

TOTAL (50 max): _____

COMMENTS:

CROSSTOWN WALK – ASSESSMENT OF PARTICIPATION IN GROUP ASSIGNMENTS**GROUP:** _____Each student must complete the items below and return independently of the team report.

YOUR NAME: _____

GROUP MEMBER(S) & ROLE:

Organizer: _____

Recorder: _____

Reporter: _____

Other: _____

For each group member, including yourself, fill in the table below. Note: rate performance in each category on a scale from 1 to 5 where 1=unsatisfactory and 5=exemplary.

NAME	Attends group meetings (1-5)	Participates in discussions at meetings (1-5)	Completes assignments on time (1-5)	Completes assignments fully (1-5)

If you were given 100 points to distribute among the group members and, based on the assessment of performance above, how many would you assign to each. For instance, if in a group of three, all members participated equally, each would be assigned 33.3 points. Unequal levels of participation would be reflected by unequal assignment of points.

NAME	Relative Contribution

It is to your benefit to complete the table in an honest and forthright fashion. Please also note that your responses will not be shown to any other student.

CROSSTOWN WALK – QUESTIONNAIRE RE: PERSONAL BACKGROUND & ATTITUDES:**PART A****Please choose the most appropriate answer:**

Where you 'grew up' would best be described as:

1-rural 2-suburban 3-a town 4-a city

Your primary abode when growing up would best be described as:

1-apartment 2-multi-family house 3-two-family house 4-single-family house

When growing up, what mode(s) of transportation did you typically use?

[Mark all that apply.]

1-car 2-bus 3-subway 4-train 5-bicycle
6-foot 7-other_____

When growing up, how often did you play basketball?

1-never 2-sometimes 3-regularly 4-often 5-very frequently

When growing up, how often did you go hiking?

1-never 2-sometimes 3-regularly 4-often 5-very frequently

When growing up, how often did you "hang out" in the neighborhood?

1-never 2-sometimes 3-regularly 4-often 5-very frequently

When growing up, how often did you go camping?

1-never 2-sometimes 3-regularly 4-often 5-very frequently

When growing up, how often did you go fishing?

1-never 2-sometimes 3-regularly 4-often 5-very frequently

When growing up, how often did you go hunting?

1-never 2-sometimes 3-regularly 4-often 5-very frequently

When growing up, how often did you go bird-watching?

1-never 2-sometimes 3-regularly 4-often 5-very frequently

PART B

Please mark all appropriate answer(s), e.g. choose all that apply:

If you or members of your family had pets, which one(s) did you/they have?

- 1- N/A 2-dog 3-guinea pig/hamster 4-cat 5-bird
6-reptile 7-fish 8-other _____

The term "environment" applies to which of the following:

- 1 - city 2- jungle 3- farm 4- park 5-forest 6 - classroom

Ecological studies are best done in:

- 1- remote locations 2- old fields 3- coastal regions 4- cities 5- suburbs

Ecologists provide information useful for managing:

- 1- national parks 2- agricultural land 3- coastal regions 4- urban areas

Environmental justice refers to:

- 1- fair and humane treatment of animals by their owners
- 2- differential impacts of environmental problems on different human communities
- 3- restoration of an environment after mining, timber harvesting or other destructive practice
- 4- fair and humane treatment of animals used in medical testing

Tools for Formative Evaluation of this Experiment

We address the question, “What is the evidence that the activities students perform in lab enable them to attain the objectives of the lab?” in three ways.

1. When the lab is a portion of the semester long assignment we evaluate the success of the project by reviewing the papers and presentations presented by each group. Evaluation, based on the rubric, allows us to examine the hypotheses and determine whether they are reasonable and testable. We can assess whether the data collected is sufficient and presented well, the students have examined “outside” literature, they have incorporated their results into a framework that indicates that they recognize the role of ecology in assessing the environment, and they recognize the interplay of humans and the environment. Often there are great differences in the methods, results, and interpretation among groups and it is critical that the product of each group be assessed independently from those of other groups.
2. We also use a pre / post lab assessment of students’ understanding of sampling methods and methods of describing and classifying site features. At the University of Missouri-Columbia this assessment is done as part of the review / resubmission process for a semester-long project.
3. To examine changes in student attitudes as a result of participating in the exercise we have developed a pre and post questionnaire that allows for some measure of change in knowledge and attitudes concerning urban ecosystems and environmental justice.

NOTE: An extensive discussion on Evaluation appears in the Teaching section of TIEE.

NOTES TO FACULTY

Challenges to Anticipate and Solve

The most difficult aspect of this exercise is getting the students to think out of their box. Depending on the class, the student, and his/her experience, almost every student tends to focus on either the environment or the ecology of the walk. That is, they may see the housing conditions or the birds in the trees; rarely do they note both. Our goal is to have students notice and devise methods of data collection for both. Thus, as the instructor interacts with each group along the initial walk, s/he will have to assess the focus of the group and provide appropriate, and often pointed, questions. This may not be true for the class as a whole or even for any particular group, and that is what makes the exercise so interesting. Each student brings her/his own perception and it is this juxtaposition and combination that results in the unexpected synergy and interaction.

During the course of the exercise, students must shift from qualitative observation to quantitative measurement. For the single lab situation, this means the shift must take place between the walk from campus and the walk back. For the multi-week lab, between the first and second lab periods. Although second nature for most of us, this shift is often problematic for students. We have found that this difficulty can be eased if not circumvented by asking the students to identify specific items that they can measure for each of the differences they observed. For example, if students' noted that that trees were larger at one end of the transect, they might suggest measuring the height or diameter of trees. Students are challenged in multi-week labs by the need to focus on qualitative method and synthesis of results. We handle this challenge by encouraging students to identify a particular context in which the information can be applied. For example, students collecting tree diameter data might be encouraged to identify how the information would be used by an urban forester and required to determine how the data should be analyzed and interpreted for this type of use.

Assignment of grades for individual students participating in group exercises can be difficult. We do not make distinctions among individuals in a group; everyone gets the same grade—regardless of level of participation. We make students aware of this at the beginning of the exercise and we monitor (via the participation rubric) during the early part of the multi-week format. If problems appear, we talk with students as necessary. We do allow groups to “fire” students who must then complete the assignment on their own. But this has happened very rarely.

Comments on the Lab Description

Introducing the Lab to Your Students:

While we provide an introduction to the exercise (see the "Synopsis"), we try to guide students by asking questions about what they observe and to not provide any additional information. In this way, we "force" students to make their own decisions regarding the data to be collected.

Activities in the Lab:

The best way to approach this exercise is to initially plan on devoting 2-3 lab periods. Take a walk around town and locate a "transect" in which you note reasonably substantial variation in housing and/or environmental conditions. It also helps to have gained some familiarity with the neighborhoods through which the transect passes. Often, and especially if you are new to the faculty, it helps to talk to old-timers who have lived in the area for at least a couple of decades. Searches through the newspapers for information about the neighborhoods, e.g., history, demographics, etc., have proven incredibly useful. Then, on the first week take the walk with the students. Provide them with hints and guidance, but let, nay encourage, each group to select its own scientific path. The class discussions will be much more interesting as a result.

STUDENT COLLECTED DATA FROM THIS EXPERIMENT

Data Set #1 — Land Cover Classification of Douglass Park

Land cover classification of Douglass Park neighborhood adjacent to Garth Avenue transect. Collected during the multi-lab version of the course.

Environmental Conditions:	Block:													
Building Conditions	7-	8-	9-	10-	11-	12-	13-	14-	15-	16-	17-	18-		
abandoned		1						1						
occupied but in need of serious repair	1	5	3					2						
Graffiti (# buildings)	1													
good to excellent conditions														
Building Type/Population Density	7-	8-	9-	10-	11-	12-	13-	14-	15-	16-	17-	18-		
single family						14	22	1	19	3	13	7		
multi-family (2-4 mailboxes)		5	5	1	1			7	1		2			
apartment (> 4 mailboxes)						1				2	6	5		
store (with liquor license)	1													
store (without liquor license)	1													
Block Conditions	7-	8-	9-	10-	11-	12-	13-	14-	15-	16-	17-	18-		
neat, and well kept	no	no	yes			no					yes	yes		
gardens flowers, etc.	nil	nil	yes			3					yes			
generally neat but some untidiness				yes		yes		yes						
in need of serious work (# buildings)	yes	yes						2	1					
environmental hazard(s)					gas									
Note: abandoned gas station at 11-12 St; brown field effect from residual oil														
Vegetation	7-	8-	9-	10-	11-	12-	13-	14-	15-	16-	17-	18-		
large (old, established trees)	2		7	2	4	11	9	7	3	4	17	10		
small (less than 10 cm in trunk width)	1	3	1		5	1	4	6	1	2	1			
other tree conditions:														
sparse foliage	1			1	1									
Safety	7-	8-	9-	10-	11-	12-	13-	14-	15-	16-	17-	18-		
street lights	2								3		1	3		
apt lights														
security signs							8	3	10	2	2	8		



- Green = Multi fam w/ lawn
- Purple= Inst. w/trees
- Pink = Comm. w/lawn
- Mint= Comm. w/trees
- Blue= 1 fam res w/trees
- Red= Park w/trees
- Yellow= Inst. w/lawn
- Brown= Comm. w/no veg.
- Tan= 1 fam res w/lawn

Land cover classification of Douglass Park neighborhood adjacent to Garth Avenue transect

Data Set #2 — Line Intercept Sampling of One Block of Garth Avenue Transect

Results of line intercept sampling of one block of Garth Avenue transect (title of table indicates land cover classification). Collected during multi-lab version of course.

Single Family With Lawns							
	Ground Layer			Shrub Layer		Tree Layer	
Transect	%Grass	%Paved	%Bare	%Covered	#Stems	%Covered	#Stems
1	75	20	5	0	0	0	0
2	55	45	0	0	0	0	0
3	60	30	10	20	5	0	0
4	15	75	10	0	0	10	1
5	30	70	0	5	1	0	0
6	65	20	15	35	16	20	1
7	80	20	0	0	0	0	0
8	60	40	0	15	20	0	0
9	30	55	15	25	3	30	2
10	70	25	5	25	7	5	0
11	20	80	0	10	3	0	0
12	45	55	0	5	1	5	0
13	60	30	10	20	2	0	0
14	35	50	15	20	3	10	1
15	45	45	10	35	15	15	2
16	75	10	15	45	35	0	0
17	50	45	5	15	3	0	0
18	70	30	0	20	18	0	0
19	40	30	30	40	12	10	10
20	55	30	15	30	5	5	0
Average	51.75	40.25	8	18.25	7.45	5.5	0.4

Data Set #3 — Bird Census in Ridgeway

Results of bird census in Ridgeway neighborhood adjacent to Garth Avenue transect. Collected during multi-lab version of course.

Species	King Ave	4th	3rd	Garth Ave	W. Sexton	Jewell	Bus. Loop
American Robin	3	5	12	1	2	0	2
European Starling	4	4	1	10	6	2	0
Grackle	0	3	0	0	1	0	1
N. Cardinal	1	1	1	0	0	0	0
House Sparrow	0	13	0	0	0	2	0
Crow	0	1	0	0	0	0	2
Mourning Dove	0	0	0	0	0	0	0
Purple Finch	0	0	0	0	0	3	0
Red Bellied Woodpecker	0	0	0	0	0	0	0
Chickadee	0	0	0	0	0	0	0
Species	Benton	E. Forest	Grand	W. Forest	E. Sexton	Austin	Providence
American Robin	6	2	1	2	2	2	1
European Starling	2	0	2	6	3	5	0
Grackle	0	0	0	0	0	0	0
N. Cardinal	0	1	0	1	2	0	0
House Sparrow	12	4	0	1	0	1	0
Crow	0	0	0	0	0	0	1
Mourning Dove	0	0	0	0	1	1	0
Purple Finch	0	1	0	2	0	0	0
Red Bellied Woodpecker	0	2	0	0	0	0	0
Chickadee	0	0	0	0	0	1	0

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