From Gergel, S.E. and M.G. Turner. 2002. Learning landscape eoclogy: a practical guide to concepts and techniques. Springer-Verlag. 316 pp.

CHAPTER 2

COLLECTING SPATIAL DATA AT BROAD SCALES

SARAH E. GERGEL, MONICA G. TURNER, AND
DAVID J. MLADENOFF

OBJECTIVES

Spatial data are routinely used by landscape ecologists to formulate hypotheses, examine trends in landscape patterns, and make management decisions. Thus, a basic familiarity with the variety of data sources currently available, and an understanding of differences and similarities among them, is a fundamental part of landscape ecology. The goals of this lab are to

1. demonstrate the methods used to obtain spatial data at broad scales;
2. illustrate the differences among and the limitations of different data sources;
3. convey the challenges of collecting and using spatially explicit data; and
4. combine field and laboratory results to illustrate the connections between ground-level data, remote-sensing data, topographic maps, and Geographic Information System (GIS) data.

As a class, students will collect reference data at several field sites selected by the instructor. The data obtained from field sampling will be compared in the laboratory to data collected from other data sources such as aerial photos, topographic maps, satellite imagery, and GIS layers available for your area.

INTRODUCTION

Spatial data commonly used in landscape ecology come from a variety of sources, such as field sampling, aerial photos, topographic maps, satellite images, or an existing GIS. The spatial data from these sources are created using different techniques, have their own set of inherent assumptions, and may accentuate or minimize certain landscape features. Different spatial data types also have different sources of error and provide information at different levels of resolution. Thus, the first step in using spatial landscape data often involves verifying the accuracy of the different sources of data as well as determining which sources fit the needs of the project at hand.

Accuracy assessment involves verifying the accuracy and legitimacy of spatial data against a reliable source of reference data. Field-collected reference data can also be used *a priori* in the preparation of spatial data. Here, we simplify the procedure in order to give you exposure to as many different types of data sources as possible. The class will work in small groups (three to four people) to collect field data at different sites throughout the local area. The field results will then be compared to data collected from selected spatial data sources in the laboratory.

DATA ANALYSIS

After the data collection from your field transects is complete, each group will be responsible for calculating the following summary statistics *for each transect in their area*:

1. Proportion (p) of the total length of each transect occupied by each cover type
2. Mean segment length for each cover type
3. Edges, or the number of times you cross a boundary between two different cover types
4. Coefficient of variation (% CV) for each variable (p, mean segment length, and edges) for each cover type, across all data sources

The following formulas may be helpful, where n is the number of segments and x is any variable (p, mean segment length, or edges):

Standard Deviation (s)	Mean ($\bar{x}$)	Coefficient of Variation (%)
$\sqrt{\dfrac{n\sum x^2 - \left(\sum x\right)^2}{n(n-1)}}$	$\dfrac{\sum x}{n}$	$\dfrac{\bar{x}}{s} \times 100$

Results will be reported using **Table 2.1, Summary Data Sheet,** on the CD. These statistics will be computed again after resampling the same transects using the other data sources.

WRITE-UP

Your assignment includes five main parts:

1. Introduction—Briefly describe the objectives of the exercise and how well they were met.
2. Methods
   (a) Discuss your rationale behind transect placement.

(b) Clearly identify the spatial extent, minimum mapping unit, and classification scheme you used.
(c) Discuss any other decisions you made during data collection or analysis that are important for the interpretation of your data.

3. Results—Include your completed **Summary Data Sheet** (Table 2.1 on the CD).
4. Discussion—Address the following questions in your discussion:
   (a) Were there consistent differences in the information obtained from the different data sources?
   (b) How different and/or similar were the results obtained by the different methods?
   (c) What explains the differences and/or similarities in your summary statistics?
   (d) How well did your sampling capture the land-cover types at your site?
   (e) How well do your data portray the fragmentation and connectivity of your site?
   (f) From your experience, discuss the apparent utility of each data source. Are particular types of research questions best suited to particular data sources? Which land-cover types are best observed using the different data sources?
5. Appendix—Attach a copy of your raw field notes.

BIBLIOGRAPHY

Note. An asterisk preceding the entry indicates that it is a suggested reading.

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