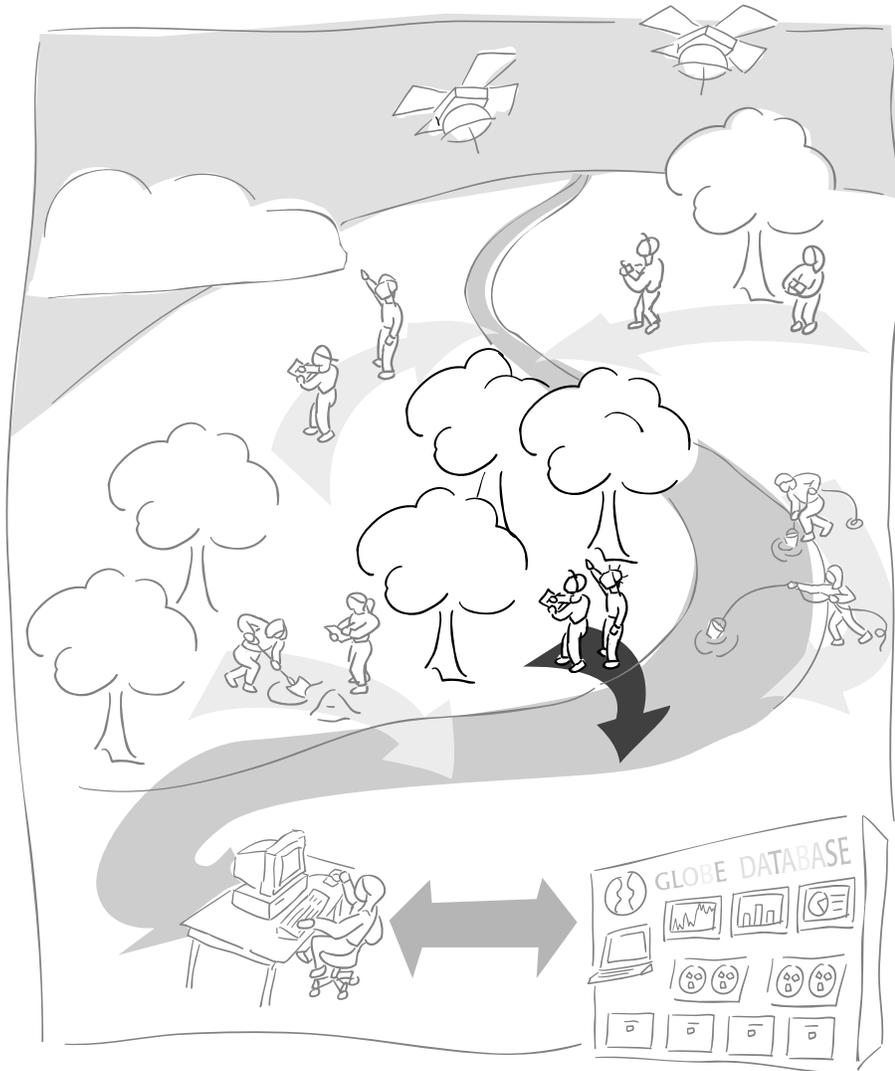


# Land Cover/Biology Investigation



**A GLOBE® Learning Investigation**



# Land Cover/Biology Investigation at a Glance



## Protocols

### *Land Cover Sample Site Protocol*

Data collected once for each site: GPS location, photographs, land cover classification.

### *Biometry Protocol*

Data collected once to determine land cover class of Land Cover Sample Sites or more often to study changes in biomass over time: canopy cover and ground cover, tree, shrub and/or graminoid height, tree circumference, graminoid biomass, dominant and co-dominant vegetation.

### *Manual Land Cover Mapping Protocol and Computer-aided Land Cover Mapping Protocol*

Perform once to create a land cover type map of your GLOBE Study Site and then update as desired.

### *Land Cover Change Detection Protocol*

Perform once to create a map that illustrates changes that have occurred over time (period of a few years) in your GLOBE Study Site.

## Suggested Sequence of Activities

**Note:** Certain Learning Activities are desirable prior to implementing Protocols.

Read the *Introduction*, especially *Measurement Logistics* and *Suggested Methodology*.

Perform *Getting to Know Your Satellite Imagery and GLOBE Study Site Learning Activity*.

Make a densiometer and clinometer (see *Investigation Instruments*).

Review how to pace and use a compass, densiometer, clinometer and tape measure (see *Investigation Instruments*).

Practice the *GPS Protocol* (see *GPS Chapter*) and the *Biometry Protocol*.

Choose appropriate Land Cover Sample Sites within your Study Site (review *Sample Site Selection and Set-up*).

Perform the *Site Seeing Learning Activity* - introduces systems concepts.

Perform the *Leaf Classification Learning Activity* - introduces the concepts of classification.

Practice using the MUC System to classify land cover.

Perform *Land Cover Sample Site Protocol* at each Sample Site.

Perform the *Odyssey of the Eyes Learning Activity* - introduces remote sensing.

Perform either *Manual Mapping: A Tutorial for the Beverly, MA Image* (from the *Appendix*) if you will be doing a manual map or the *Unsupervised Clustering Tutorial* (from the MultiSpec CD) if you will be doing a computer-aided map.

Perform either *Manual* or *Computer-aided Land Cover Mapping Protocol* using your GLOBE Study Site satellite image.

Perform the *Bird Beak Accuracy Assessment Learning Activity* - introduces accuracy assessment.

Perform the *Accuracy Assessment Tutorial* from the *Appendix* to analyze the accuracy of your land cover type map.

Perform the *Land Cover Change Detection Protocol*.

Perform the *Discovery Area Learning Activity* - uses the satellite images and maps students create.

*Using GLOBE Data to Analyze Land Cover Learning Activity* - relates land cover data to other GLOBE investigation measurements.

# Table of Contents

## **Introduction**

The Big Picture .....	Introduction 1
Why Investigate Land Cover .....	Introduction 2
Scientists Need GLOBE Data .....	Introduction 5
Educational Objectives .....	Introduction 5
Measurement Logistics .....	Introduction 10
Suggested Methodology .....	Introduction 14
Protocols at A Glance .....	Introduction 13
Implementation Considerations .....	Introduction 19

## **Protocols**

Sample Site Selection and Set-Up
Investigation Instruments
Land Cover Sample Site Protocol
Biometry Protocol
Manual Land Cover Mapping Protocol
Computer-aided Land Cover Mapping Protocol*
Land Cover Change Detection Protocol*
Fire Fuel Ecology Protocol*

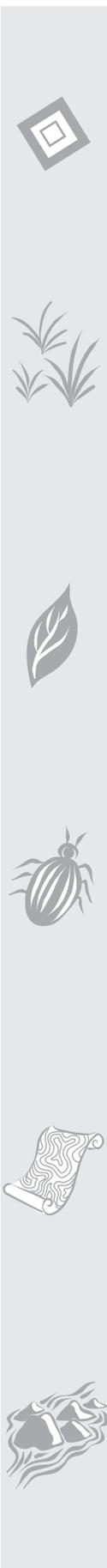
## **Learning Activities\***

Getting to Know Your Satellite Imagery and GLOBE Study Site*
Site Seeing*
Leaf Classification*
Odyssey of the Eyes*
Bird Beak Accuracy Assessment*
Discovery Area*
Using GLOBE Data to Analyze Land Cover*

## **Appendix**

Clinometer Sheet .....	Appendix 2
Table of Tangents .....	Appendix 3
Table of Cosines .....	Appendix 4
MUC Classification Practice Examples .....	Appendix 5
Manual Mapping: A Tutorial for the Beverly, MA, Image .....	Appendix 8

\* See the full e-guide version of the *Teacher's Guide* available on the GLOBE Web site and CD-ROM.



Accuracy Assessment Tutorial ..... Appendix 15  
Land Cover Sample Site Data Sheet ..... Appendix 25  
Tree Canopy and Ground Cover Data Sheet ..... Appendix 26  
Shrub Canopy and Ground Cover Data Sheet ..... Appendix 28  
Graminoid, Tree, and Shrub Height Data Sheet ..... Appendix 30  
Alternative Clinometer Techniques Data Sheets ..... Appendix 31  
Tree Circumference Data Sheet ..... Appendix 37  
Graminoid Biomass Data Sheet ..... Appendix 38  
Accuracy Assessment Work Sheet ..... Appendix 39  
MUC System Glossary ..... Appendix 40  
Land Cover Glossary ..... Appendix 61