THE GLOBE PROGRAM

A worldwide science and education program

Biosphere • Biometry Protocol

Canopy Cover and Ground Cover Field Guide

A. What is Canopy Cover and Ground Cover?
B. Why collect Canopy Cover and Ground Cover data?
C. How your measurements can help.
D. How to collect your data.
E. Entering data on GLOBE Website.
F. Understand the data.
G. Quiz yourself.
H. Additional information

Overview

This module:

- Reviews the selection of a GLOBE land cover study site
- Reviews the procedure for locating your site using a GPS receiver
- Provides a step by step introduction of the protocol method

Learning Objectives

After completing this module, you will be able to:

- Define canopy cover and ground cover and explain how these measurements can support understanding of satellite images
- Understand the importance of quality control steps in the the collection of accurate data
- Explain how canopy cover and ground cover measurements are used to determine a site's MUC Classification
- Conduct canopy cover and ground cover measurements in the field
- Upload data to the GLOBE portal
- Visualize data using GLOBE's Visualization Site

Estimated time to complete module: 1.5 hours

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The Biosphere

- The Biosphere is Earth's zone of life. Every organism on Earth belongs to the biosphere. GLOBE has several ways to explore and measure components of the Biosphere through investigations in **land cover** and **phenology**. As well, the Hydrosphere investigations include the macroinvertebrates and mosquito larvae protocols.

- Like all parts of the Earth system, the **Biosphere** is subject to change. We can quantify these changes by taking measurements over time, and compare what we saw in the past to what we see in the present.

- **Canopy Cover and Ground Cover** measurements are part of GLOBE's Biosphere protocols.

Photo Credit: Shelley E. Olds

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What is Biometry?

Biometry is the measuring of living things. A scientist is interested not only in the characteristics of vegetation at a study site, but also how it is distributed. How dense is the forest? Does sunlight penetrate to the forest floor? Is the landscape dominated by grasses? Has there been a recent disturbance, such as a forest fire or flood? These are questions that are answered by taking biometric measurement of land cover.

In this protocol, you will be measuring canopy cover and ground cover. Land cover is a general term for the differences in vegetation we see on the land. **Canopy cover and ground cover are two land cover measurements.**

The GLOBE Biometry Protocols (list, right) will assist you in determining the MUC classification of your study site.

GLOBE Biometry Measurements

Land Cover Sample Site

Canopy Cover and Ground Cover

Graminoid, Tree and Shrub Height

Tree Height on Level Ground: Simplified Clinometer Technique

Tree Height on Level Ground: Standard Clinometer Technique

Tree Height on a Slope: Stand by Tree

Tree Height on a Slope: Two-Triangle Techniques

Tree Circumference

Graminoid Biomass

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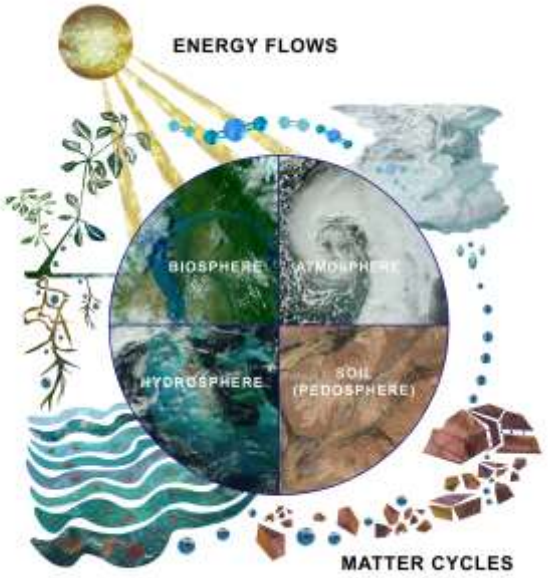
Why Study Land Cover?

Land cover includes both developed and natural areas. All living things depend on their habitat, or land cover, for survival. They find shelter, food, and protection there. Land cover has a direct effect on the kinds of animals that will likely inhabit an area. Therefore, land cover is of great interest to ecologists, who study how plants and animals relate to their environment.



The Earth System: Energy flows and matter cycles.

Land cover can influence weather, soil properties, and water chemistry. Different land cover types are all distinct in their effects on the flow of energy, water and various chemicals between the air and surface soil. Knowing what types of land cover occur is important for a variety of Earth system science investigations.

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GLOBE Land Cover Investigations

Land cover is a general term used to describe what is on the ground covering the land. Different land cover terms are used to describe the differences we see when we look at the land. Scientists classify land cover based on established criteria. This is done so that there is a consistent use of terms among people. For instance, what one person may call a forest living in the tropical Amazon may be quite different from a person living in northern Canada. Different species of trees live in these places, trees may be of different heights and the amount of ground and canopy cover may be quite different. For this reason, we need a standardized way to describe land cover.

GLOBE uses a land cover classification scheme called **Modified UNESCO Classification (MUC)**. There are many different types of classification schemes used. These are often designed for specific places or regions. MUC can be used around the world and allows people to contribute to a global data base.

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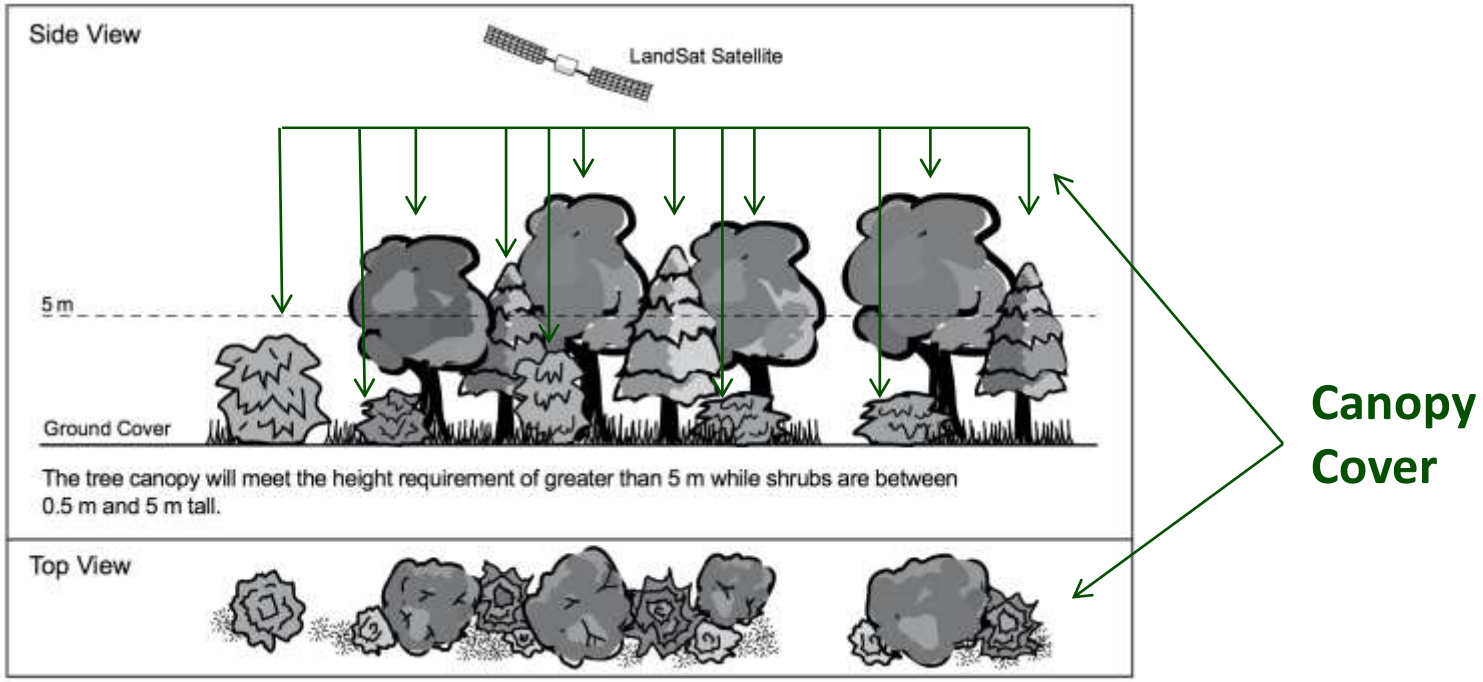
What is Canopy Cover?

Canopy cover describes the proportion of land area covered by either tree crowns or shrub crowns, **as viewed from the air**. It is a measurement used to describe the density of trees in a forest or tree stand, and the cover of shrubs in a shrub land. It helps to correctly choose the correct MUC land cover type.



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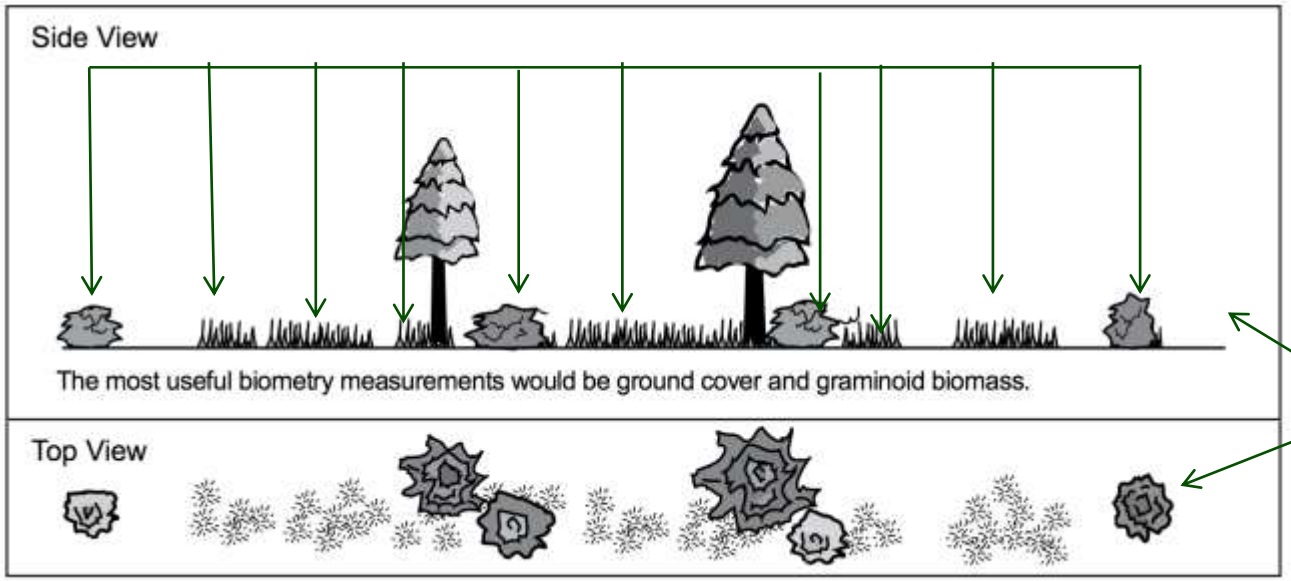
What is Ground Cover?

Ground Cover refers to the proportion of land that is covered by vegetation. This measurement is useful for calculating standing biomass, as well as understanding erosion and other geological processes taking place on the landscape. As with canopy cover, it helps to correctly choose the correct MUC land cover type.



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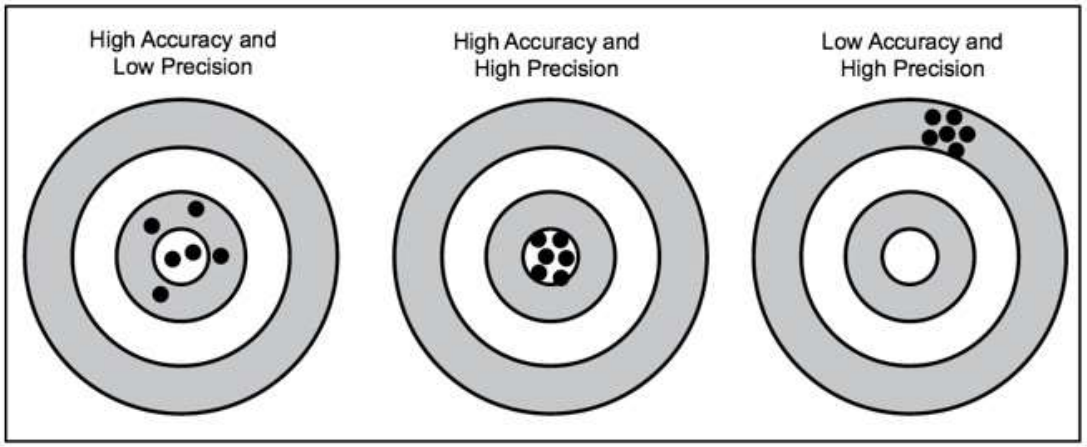
Why Collect Biometry Data?

Biometry measurements are useful for scientists who want to use your Land Cover Sample Site data. It helps to make sure that the MUC class you select is correct. Biometry measurements can help them assess how accurate and precise a land cover data set is. **Accuracy** is a measure of how well the data describe a phenomenon. **Precision** is demonstrated when repeated measurements yield the same outcome. In most GLOBE protocols, you are asked to take a measurement 3 times – allowing for you – as well as other scientists – to determine the precision of your data.



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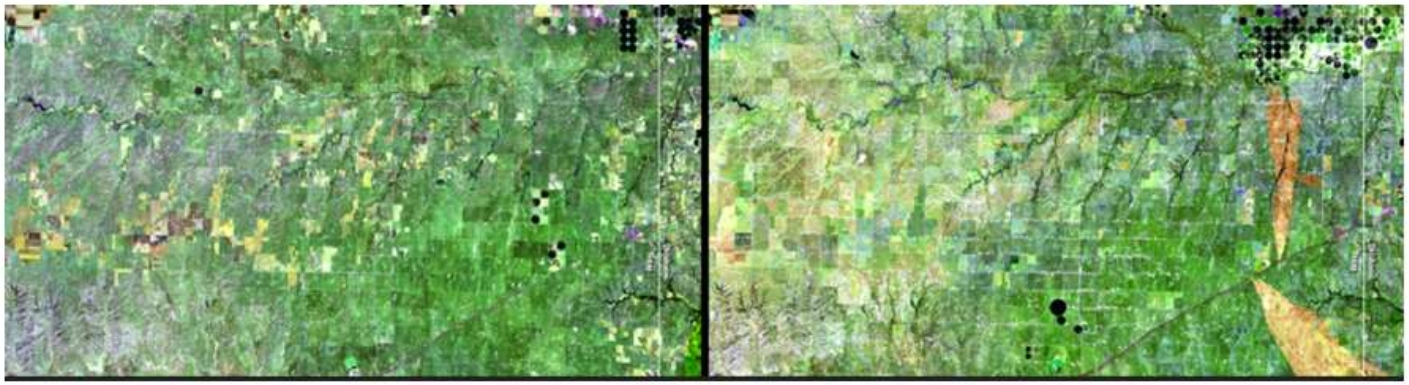
Why Collect Canopy Cover and Ground Cover Data?

Measuring canopy cover and ground cover is a class of biometric measurements that allow us to understand the movement of materials through the Earth system, as well as interpret remotely sensed images of vegetation cover from satellites. By making quantitative measurements, it is possible to document vegetation changes that take place on the landscape over time.



May 6, 1986 May 3, 2014

These images show a portion of the Texas Panhandle, bordering Oklahoma. The area contains more than 3,600 oil and natural-gas wells, seen here as white spots. The reduced vegetation (green) in the 2014 image was caused by several recent years of drought. Other visible changes include additional center-pivot irrigation systems (dark circles) and several new burn scars from wildfires in March 2014. Source: *NASA Images of Change.*

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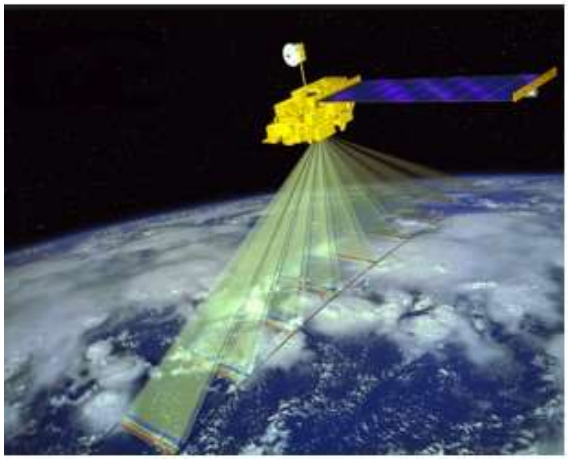
Mapping

An important objective of the land cover investigation to assess the accuracy of maps created by satellite images and aerial photographs.

Remote sensing simply means learning about something without making direct contact with it. We use remote sensing every day by hearing, smelling, and seeing.

With satellites and aircraft, we use machines to be our "eyes" in the sky or in orbit. Remote sensing in space has the great advantages of being able to cover very large areas quickly and to revisit the same area frequently. However, some of the detail that can be seen at ground level may not be detected by a remote sensing system. Therefore, it is beneficial to collect data at sample sites on the ground to accompany remotely sensed data about an area. GLOBE land cover data can contribute to making better, more accurate maps.



Terra's Terra's five instruments provide measurements of plant (vegetation) composition, structure, extent, and change. Image: NASA.

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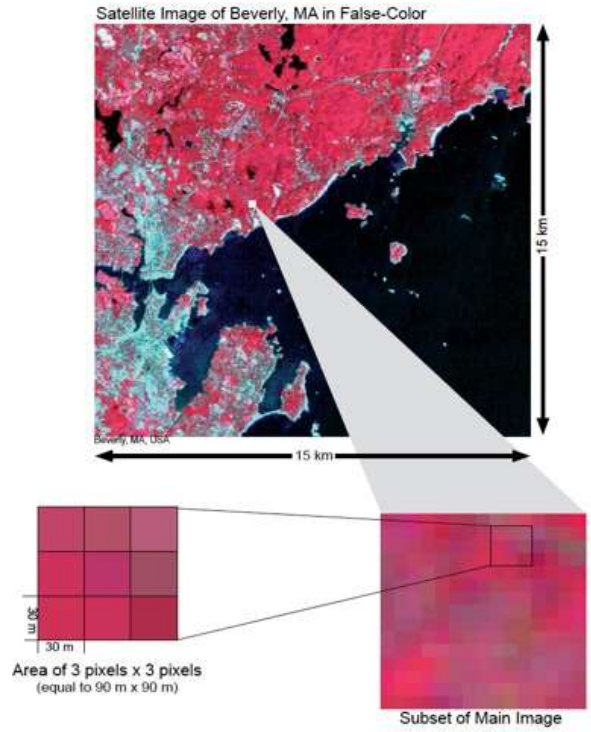
How Your Measurements Can Help: Scientific Importance of Canopy Cover and Ground Cover Data

- **Remote sensing from space** has the great advantage of being able to cover very large areas quickly and to revisit the same area frequently. However, some of the detail that can be seen at ground level may not be detected by a remote sensing system.
- Therefore, it is beneficial to collect data at sample sites on the ground to accompany remotely sensed data about an area. It is not possible to effectively visit every place on Earth to map the land cover. Instead, we rely on samples – actual ground visits – and relate these samples to what we can see using various remote sensing systems. That's where GLOBE comes in- these data are not only useful to you in your analyses, but also help scientists validate data obtained remotely.
- Your land cover measurements are used to verify satellite analysis of land cover.



As you zoom in on a 15 km x 15 km satellite image, the pixels (which are 30 m x 30 m in size) become visible. You will be taking field measurements at sites that are 90 m x 90 m (equal to 3 pixels x 3 pixels).

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Let's do a quick review before moving onto data collection!

Question 1

1. What part of the Earth system is known as the zone of life?

A. Atmosphere

B. Biosphere

C. Lithosphere

D. Hydrosphere

Do you know the answer?

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Let's do a quick review before moving onto data collection!
Answer to Question 1

1. What part of the Earth system is known as the zone of life?

A. Atmosphere

B. Biosphere- ☺ correct!

C. Lithosphere

D. Hydrosphere

Were you correct?

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Let's do a quick review before moving onto data collection! Question 2

2. If you wanted to investigate a question such as, "How dense is the forest?" or "Is the landscape dominated by grasses?", you would do this kind of measurement:

A. Biometry

B. Phenology

C. Lithosphere

Do you know the answer?

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Let's do a quick review before moving onto data collection!
Answer to Question 2

2. If you wanted to investigate a question such as, "How dense is the forest?" or "Is the landscape dominated by grasses?", you would do this kind of measurement:

A. Biometry ☺ correct!

B. Phenology

C. Lithosphere

Were you correct?

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Let's do a quick review before moving onto data collection! Question 3

3. Look at this image. Is this an example of:

A. High accuracy, low precision

B. High accuracy, high precision

C. Low Accuracy, high precision

What is your answer?

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Let's do a quick review before moving onto data collection!
Answer to Question 3

4. Look at this image. Is this an example of:

A. High accuracy, low precision

B. High accuracy, high precision

C. Low Accuracy, high precision ☺ correct!

Were you correct? Let's now look at how to collect your data!

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How to Collect Data: What do you need to start?

When	During peak growth period- can be repeated annually as desired
Where	A homogeneous GLOBE Land Cover Site
Time Needed	About 2-3 hours to take field measurements
Prerequisites	Land Cover Sample Site Protocol
Key Instrument	Densiometer
References	Copies of GLOBE Canopy Cover and Ground Cover Field Guide and Land Cover Data Sheet

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Time and Frequency of Data Collection

The protocol requires measurements of canopy cover. For this reason, the best time to complete this measurement is when the leaves are open, that is, during the **growing season**. The measurements will take between 1-3 hours.

The frequency of the measurements you decide to take will **depend on your research questions and goals.** For instance:

- You can take biometry measurements only once in a site during peak growth. You use the data to determine the correct MUC choice. This baseline data is critical for scientists.
- You can take measurements twice a year, during peak growth and dormancy periods (winter or drought), to measure seasonal change.
- You can return to the same study site year after year and repeat the biometry measurements to track changes in site biomass over time.

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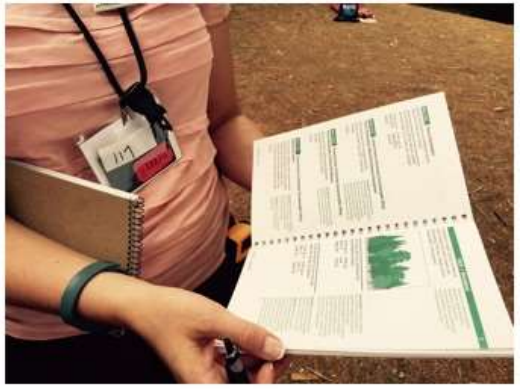
Before you Begin: Prerequisite Measurements

Before you begin taking Canopy Cover and Ground Cover measurements, you will need to have already identified your **Land Cover Sample Site**. Measurements taken using the **Canopy Cover and Ground Cover Field Guide** will support completion of the **Land Cover Sample Site Protocol.** Ultimately, you will be able to identify the scientific classification of the plant community observed using the **MUC Guide**.

This tutorial provides the directions for completing measurements in the **Canopy Cover and Ground Cover Field Guide.** If you are ready to begin documentation of Canopy Cover and Ground Cover, start with the next slide.



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To Describe Canopy Cover and Ground Cover, You Will Need the Following Equipment:

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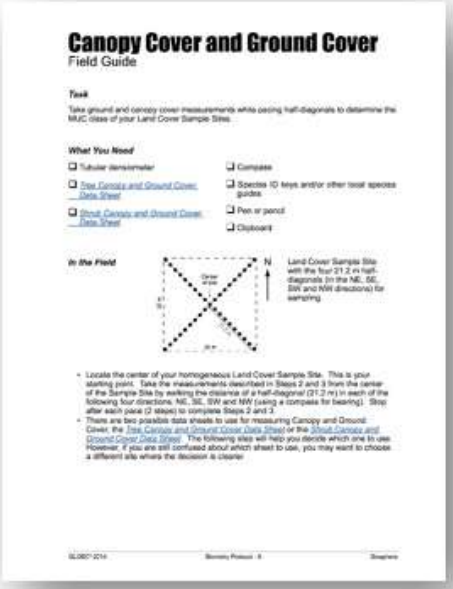
To Describe Canopy Cover and Ground Cover, You Will Need the Following Documents:

- Canopy Cover and Ground Cover Field Guide
- Land Cover Tree and/or Shrub Canopy and Ground Cover Data Sheet
- Biosphere Investigation Instruments: Densiometer
- Biometry Protocol



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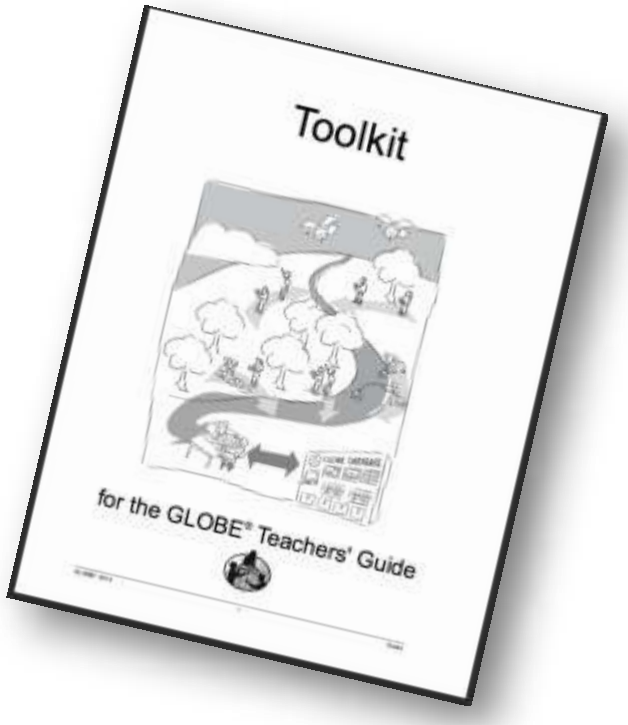
Sources for Equipment You Need:

Instructions for making a **homemade densiometer** follow on the next slide.



For Other Equipment:

The following resources summarize the measurements associated with each protocol, associated skill level, scientific specifications for the instruments, and how to access the equipment you need (purchase, build, or download).

Where to find specifications for instruments used in GLOBE investigations

Where to find scientific instruments used in GLOBE investigations

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Build Investigation Instrument- Densiometer

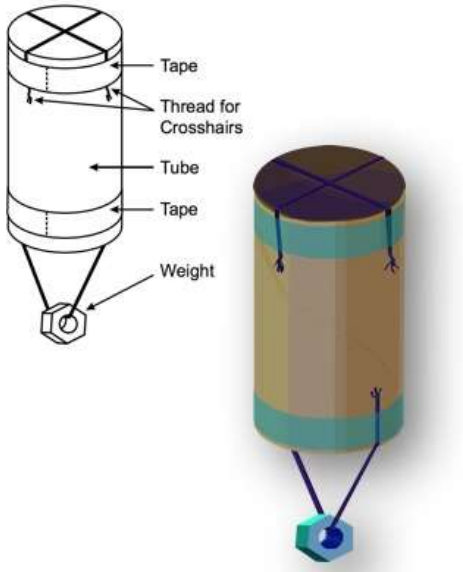
A densiometer is an instrument used for taking measurements of canopy cover. The following includes directions to construct and use the densiometer.

Required Materials

- 4 cm by 7.5 cm long tube (toilet paper tube, construction paper, PCV pipe)
- 34 cm of thread or dental floss
- Metal nut or washer, tape

Construction

1. Gather the required materials.
2. Attach with tape two threads across the diameter of one end of the tube to form a crosshair. Leave a short end that you can pull to tighten the thread if necessary.
3. Attach with tape an 18 cm piece of thread with a metal nut or washer hanging loosely from it across the diameter of the other end of the tube, across from the crosshairs.



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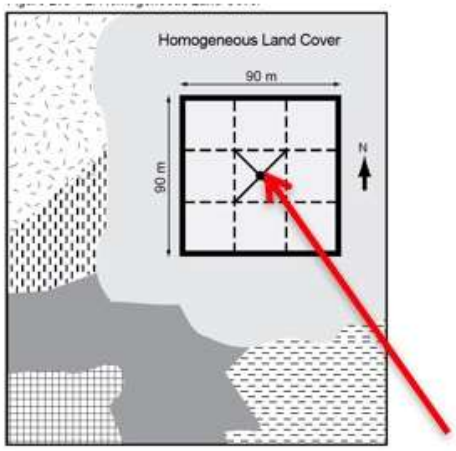
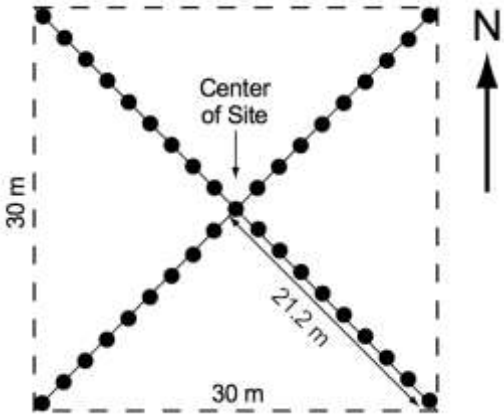
Identify Your Sample Area in the Field

Before you take canopy and ground cover measurements, you need to have defined your Land Cover Study Site. You will be returning to the location of your **Land Cover Sampling Site** that you identified in a previous field excursion.



Locate the center of your homogeneous Land Cover Sample Site. This is your starting point.



Land Cover Sample Site with the four 21.2 m half-diagonals In the NE, SE, SW and NW directions for sampling.

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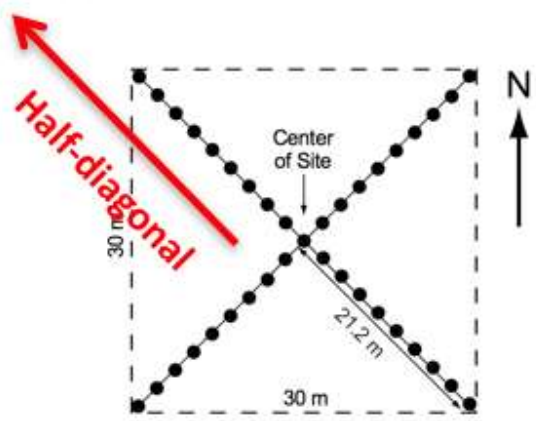
Define your Half Diagonal Transects

You will make your measurements by walking the distance of a **half-diagonal** (21.2 m) in each of the following four directions: NE, SE, SW and N. (use a compass to determine the directions.) For instructions how to use the compass, see

Biosphere Investigation Instrument: Compass

You will stop after each pace (2 steps) to make each measurement.



Before you begin you will need to "pace yourself"- calculate how many paces you make in 21.2 meters. Do this by stretching a meter tape 21.2 meters, and walk the tape, counting your steps. A pace is two steps.

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Canopy Cover and Ground Cover Protocol Steps

After you identify your sampling area, continue to follow the Canopy Cover and Ground Cover Field Guide, beginning with step 2 in the guide. You will be able to determine the dominant canopy cover through calculations at the end of the protocol.

Note: The protocol steps have been simplified, there is now only one shared data sheet for canopy and ground cover. The Protocol instructions in the GLOBE Teacher's Guide will be updated soon.

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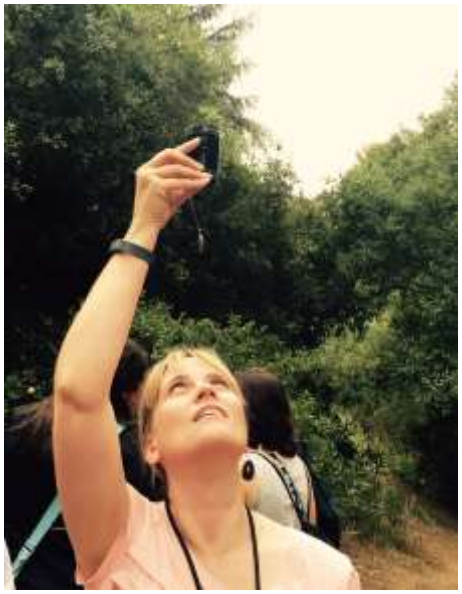
Begin at Step 2. Canopy Cover Measurements

You will take a measurement each pace as you walk your half diagonal transect.

Look up through your densiometer at the canopy, making sure it is vertical and that the metal nut/washer is directly below the intersection of the crosshairs at the top of the tube. Look at the highest canopy in your spot.

a. If you see vegetation, twigs or branches at the crosshairs, record a **(+)** on the data sheet. If you see sky at the cross, record a **(-)**.



Here, the sighting threads crossover on vegetation= + reading will be recorded on the data table.

When using densiometer, be sure you are looking straight up, perpendicular to the ground.

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Decide Whether the Canopy is Dominated by Trees or by Shrubs

- Identify whether the plant you see through the densiometer is a tree **(T)** or a Shrub **(Sh)**.

Remember that trees are over 5 m. If the plant is 50 cm-5 m, it is categorized as a shrub.

- If you record a **(+)**, identify the species name. If you do not know the genus and species but know the common name, record the common name. If you do not know the common name, collect a leaf or describe or sketch it for identification later in the classroom.

A. What is Canopy Cover and Ground Cover?
B. Why collect Canopy Cover and Ground Cover data?
C. How your measurements can help.
D. How to collect your data.
E. Entering data on GLOBE Website.
F. Understand the data.
G. Quiz yourself.
H. Additional information

Canopy Cover Measurements

- Record the canopy type as Evergreen **(E)** or Deciduous **(D)** on the data table.

Deciduous trees and shrubs have flat, broad leaves and shed their leaves at the end of the growing season, usually fall in temperate climates, or the onset of the dry season in tropical climates.

Evergreen trees and shrubs retain their needles or scales throughout the year.

A. What is Canopy Cover and Ground Cover?

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D. How to collect your data.

E. Entering data on GLOBE Website.

F. Understand the data.

G. Quiz yourself.

H. Additional information

3. Describing Ground Cover

At each pace, you will describe both the canopy and the ground cover. After you describe the canopy, look down. To describe ground cover, stand with your feet shoulder-width apart and look down and observe any vegetation that is touching your foot or touching below the knee. Do not pick up your foot, only describe the vegetation touching you without moving.

Common fieldwork error: do not measure ground cover by looking down using the densiometer! Use the densiometer for canopy cover only!

A. What is Canopy Cover and Ground Cover?
B. Why collect Canopy Cover and Ground Cover data?
C. How your measurements can help.
D. How to collect your data.
E. Entering data on GLOBE Website.
F. Understand the data.
G. Quiz yourself.
H. Additional information

Measuring Ground Cover

- (3) If the vegetation is green (alive), record a **(G)** on the data sheet
- If the vegetation is green, record if it is graminoid (grasslike) **(GD)**, other green vegetation **(OG)**, Shrub **(SB)** or Dwarf Shrub **(DS)**.
- If the vegetation is brown but still attached, record a **(B)**.
- If there is no vegetation, record a **(-)** on the data sheet.

In this photo, the field scientist recorded Graminoid (GD) (on leg) and Other Green vegetation (OG) by big toe on left foot.

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D. How to collect your data.
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F. Understand the data.
G. Quiz yourself.
H. Additional information

Calculate the Percentages for Each Column of the Data Sheet

4. After you have completed your measurements, fill our the summary tables on the **Tree/Shrub Canopy and Ground Cover Data Sheet** and calculate percentages.

A. What is Canopy Cover and Ground Cover?
B. Why collect Canopy Cover and Ground Cover data?
C. How your measurements can help.
D. How to collect your data.
E. Entering data on GLOBE Website.
F. Understand the data.
G. Quiz yourself.
H. Additional information

Let's do a quick review before moving onto data entry. Question 4

4. When should you take canopy cover and ground cover measurements?

A. All times of year are fine

B. During the peak growth period, usually summer or the wet season

C. Repeat the measurements every two weeks

Do you know the answer?

A. What is Canopy Cover and Ground Cover?
B. Why collect Canopy Cover and Ground Cover data?
C. How your measurements can help.
D. How to collect your data.
E. Entering data on GLOBE Website.
F. Understand the data.
G. Quiz yourself.
H. Additional information

Let's do a quick review before moving onto data entry.
Answer to Question 4

4. When should you take canopy cover and ground cover measurements?

A. All times of year are fine

B. During the peak growth period, usually summer or the wet season ☺ correct!

C. Repeat the measurements every two weeks

Were you correct?

A. What is Canopy Cover and Ground Cover?

B. Why collect Canopy Cover and Ground Cover data?

C. How your measurements can help.

D. How to collect your data.

E. Entering data on GLOBE Website.

F. Understand the data.

G. Quiz yourself.

H. Additional information

Let's do a quick review before moving onto data entry. Question 5

5. What protocol do you need to complete before taking your canopy cover and ground cover measurements?

A. All the hydrology protocols

B. Land Cover Sample Site Definition

C. The MUC guide Classification

Do you know the answer?

A. What is Canopy Cover and Ground Cover?
B. Why collect Canopy Cover and Ground Cover data?
C. How your measurements can help.
D. How to collect your data.
E. Entering data on GLOBE Website.
F. Understand the data.
G. Quiz yourself.
H. Additional information

Let's do a quick review before moving onto data entry.
Answer to Question 5

5. What protocol do you need to complete before taking your canopy cover and ground cover measurements?

A. All the hydrology protocols

B. **Land Cover Sample Site Definition** ☺ **correct!**

C. The MUC guide Classification

Were you correct?

A. What is Canopy Cover and Ground Cover?
B. Why collect Canopy Cover and Ground Cover data?
C. How your measurements can help.
D. How to collect your data.
E. Entering data on GLOBE Website.
F. Understand the data.
G. Quiz yourself.
H. Additional information

Let's do a quick review before moving onto data entry. Question 6

6. How do you use your densitometer?

A. Hold perpendicular to the ground, looking up at the canopy, and record what you see in the crosshairs

B. Hold perpendicular to the ground, look down at the groundcover, and record what you see in the cross hairs

C. Both A and B

D. None of the above

Do you know the answer?

A. What is Canopy Cover and Ground Cover?
B. Why collect Canopy Cover and Ground Cover data?
C. How your measurements can help.
D. How to collect your data.
E. Entering data on GLOBE Website.
F. Understand the data.
G. Quiz yourself.
H. Additional information

Let's do a quick review before moving onto data entry.
Answer to Question 6

6. How do you use your densitometer?

A. Hold perpendicular to the ground, looking up at the canopy, and record what you see in the crosshairs ☺ **correct!**

B. Hold perpendicular to the ground, look down at the groundcover, and record what you see in the cross hairs

C. Both A and B

D. None of the above

Were you correct?

A. What is Canopy Cover and Ground Cover?
B. Why collect Canopy Cover and Ground Cover data?
C. How your measurements can help.
D. How to collect your data.
E. Entering data on GLOBE Website.
F. Understand the data.
G. Quiz yourself.
H. Additional information

Let's do a quick review before moving onto data entry. Question 7

7. When you measure ground cover, you should record:

A. All the vegetation in the 50 cm quadrant around your feet

B. The vegetation that touches your foot or your leg under your knee

C. Both A and B

D None of the above

Do you know the answer?

A. What is Canopy Cover and Ground Cover?
B. Why collect Canopy Cover and Ground Cover data?
C. How your measurements can help.
D. How to collect your data.
E. Entering data on GLOBE Website.
F. Understand the data.
G. Quiz yourself.
H. Additional information

Let's do a quick review before moving onto data entry. Answer to Question 7

7. When you measure ground cover, you should record:

A. All the vegetation in the 50 cm quadrant around your feet ☺ correct!

B. The vegetation that touches your foot or your leg under your knee

C. Both A and B

D None of the above

Were you correct? Let's now look at how to collect your data!

A. What is Canopy Cover and Ground Cover?

B. Why collect Canopy Cover and Ground Cover data?

C. How your measurements can help.

D. How to collect your data.

E. Entering data on GLOBE Website.

F. Understand the data.

G. Quiz yourself.

H. Additional information

Prepare your Data for Data Entry. Calculate the Percentages for Each Column of the Data Sheet and Enter on the Form- Step 1

Determining the Percentage of Tree or Shrub Canopy Cover (Column 1).

Calculate the percent of tree canopy and shrub canopy and shrub canopy, using the following equation as a model:

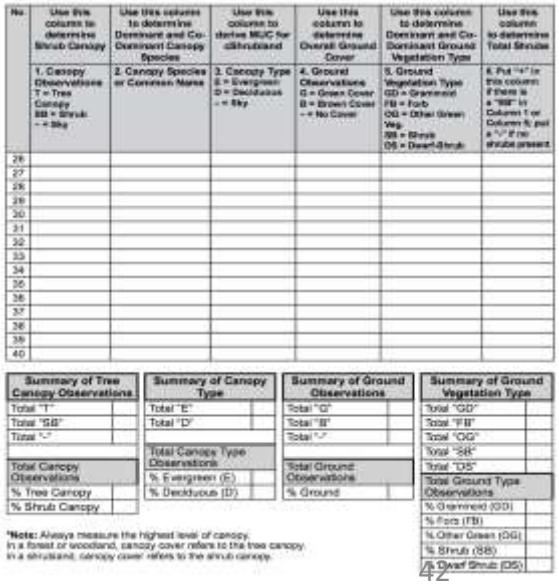
% Tree Canopy Cover= # of +'s (Tree Canopy) x 100

# of Total Observations

% Shrub Canopy Cover= # of +'s (Shrub Canopy) x 100

# of Total Observations

Record your calculated value in the first column.



A. What is Canopy Cover and Ground Cover?
B. Why collect Canopy Cover and Ground Cover data?
C. How your measurements can help.
D. How to collect your data.
E. Entering data on GLOBE Website.
F. Understand the data.
G. Quiz yourself.
H. Additional information

Calculate the Percentages for Each Column of the Data Sheet and Enter on the Form- Step 2

Determining the Percentage of Evergreen or Deciduous Canopy Cover (Column 2).

Calculate the percent Evergreen or Deciduous Canopy Cover, using the following equation as a model:

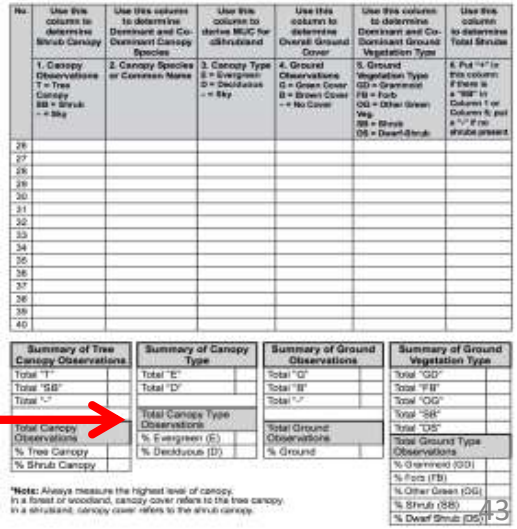
% Evergreen= # of E's(Evergreen Observations) x 100

# of E's + D's (Total Canopy Type Observations

% Deciduous= # of D's (Deciduous Observations) x 100

# of E's + D's (Total Canopy Type

Record your calculated value in the second column.



A. What is Canopy Cover and Ground Cover?
B. Why collect Canopy Cover and Ground Cover data?
C. How your measurements can help.
D. How to collect your data.
E. Entering data on GLOBE Website.
F. Understand the data.
G. Quiz yourself.
H. Additional information

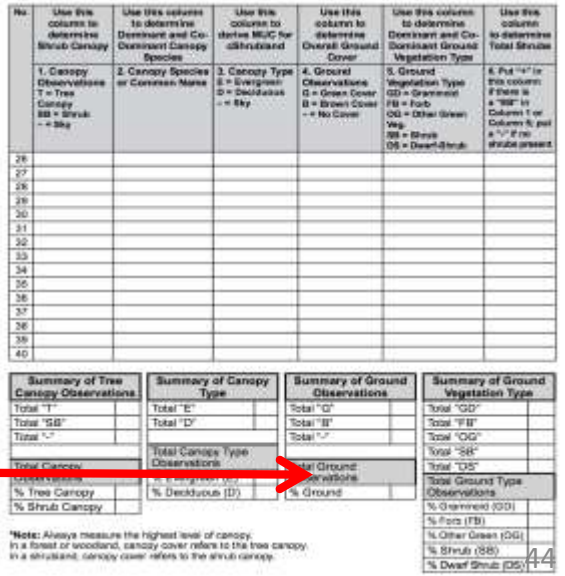
Calculate the Percentages for Each Column of the Data Sheet and Enter on the Form- Step 3

Determining the Percentage of Ground Cover (Column 3).

Calculate the percent Ground Cover, using the data collected. Use the following equation as a model:

% Ground Cover= # of G's(Green) + # of B's (Brown) x 100

# of G's + B's + (-) (total observations)



Record your calculated value in the third column.

A. What is Canopy Cover and Ground Cover?
B. Why collect Canopy Cover and Ground Cover data?
C. How your measurements can help.
D. How to collect your data.
E. Entering data on GLOBE Website.
F. Understand the data.
G. Quiz yourself.
H. Additional information

Prepare Data for Sharing on the GLOBE Website: Calculate the Percentages for Each Column of the Data Sheet

Determining the Composition of Herbaceous Coverage (Column 4). Calculate the percent of the ground that is graminoid, forb or other green vegetation using the date and the following equation as a model:

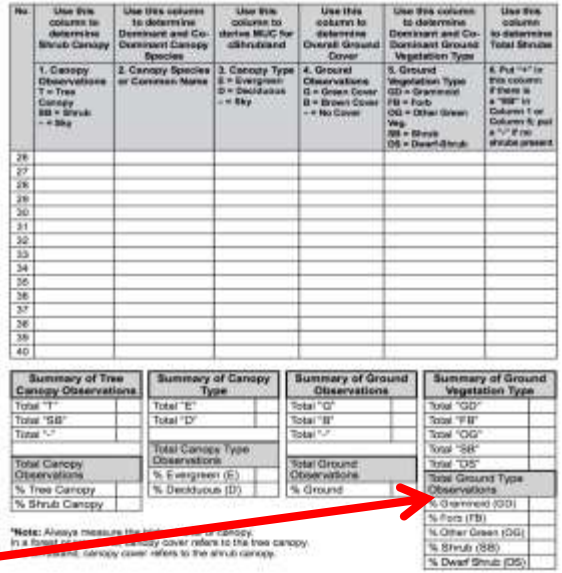
% Graminoid= # of GD's (Graminoid Observations) x 100
# of GD's + # of FB's + # of OG's + # of SB's + # of DS's
(total Herbaceous Ground Observations)

% Forbs= # of FB's (Forbs Observations) x 100
# of GD's + # of FB's + # of OG's + # of SB's + # of DS's
(total Herbaceous Ground Observations)

% Other Green Vegetation = # of OG's (Other Green Observations) x 100
# of GD's + # of FB's + # of OG's + # of SB's + # of DS's
(total Herbaceous Ground Observations)

% Shrub Vegetation = # of SB's (Shrub Observations) x 100
# of GD's + # of FB's + # of OG's + # of SB's + # of DS's
(total Herbaceous Ground Observations)

% Dwarf Shrub Vegetation = # of DS's (Dwarf Shrub Observations) x 100
# of GD's + # of FB's + # of OG's + # of SB's + # of DS's
(total Herbaceous Ground Observations)



Record your calculated values in the fourth column.

A. What is Canopy Cover and Ground Cover?
B. Why collect Canopy Cover and Ground Cover data?
C. How your measurements can help.
D. How to collect your data.
E. Entering data on GLOBE Website.
F. Understand the data.
G. Quiz yourself.
H. Additional information

Submit your Data to GLOBE

Live Data Entry: Upload your data to the official
GLOBE science database

Email Data Entry: Send data in the body of your email (not as an attachment) to **DATA@GLOBE.GOV**

Mobile Data App: Download the GLOBE Science Data Entry app to your mobile device and select the right option.
For Android via **Google Play**
For IOS via the **App Store**

A. What is Canopy Cover and Ground Cover?

B. Why collect Canopy Cover and Ground Cover data?

C. How your measurements can help.

D. How to collect your data.

E. Entering data on GLOBE Website.

F. Understand the data.

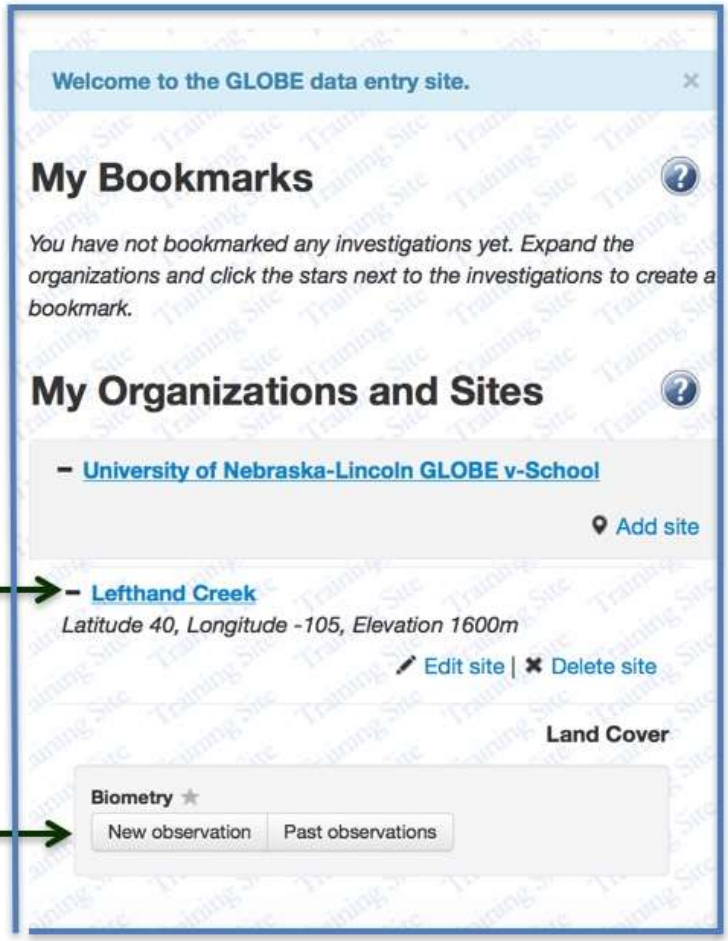
G. Quiz yourself.

H. Additional information

Entering your data via Live Data Entry or Data Entry Mobile App

Identify your Sampling site

Under Land Cover, select *"New observation"*



A. What is Canopy Cover and Ground Cover?
B. Why collect Canopy Cover and Ground Cover data?
C. How your measurements can help.
D. How to collect your data.
E. Entering data on GLOBE Website.
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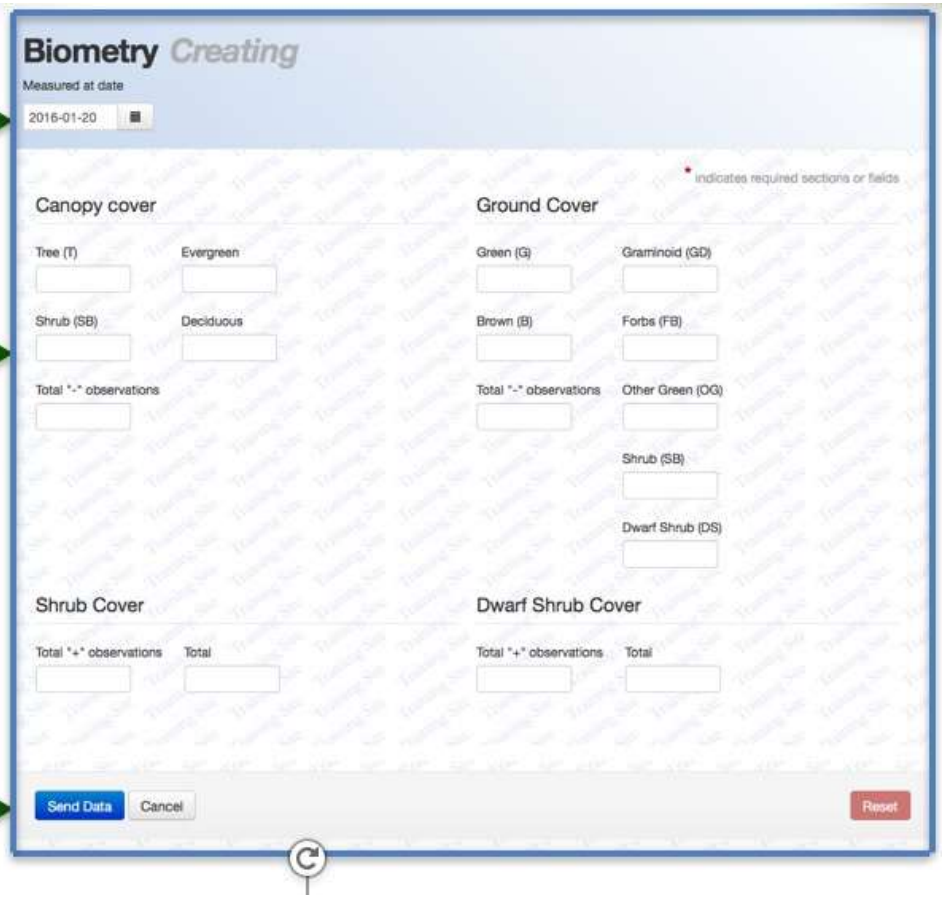
H. Additional information

On the Biometry Page, Input the date to access the form

When you input the date, you will see the rest of the form

When inputting cover values, be sure that each reporting category you identified totals 100%

Submit data



You have finished your submission. You can see land cover data submitted by others using the GLOBE Visualization Tool.

A. What is Canopy Cover and Ground Cover?

B. Why collect Canopy Cover and Ground Cover data?

C. How your measurements can help.

D. How to collect your data.

E. Entering data on GLOBE Website.

F. Understand the data.

G. Quiz yourself.

H. Additional information

Visualize and Retrieve Data: Select Land Cover

Your Canopy Cover and Ground Cover measurements will allow you to determine the Land Cover Classification of your study site. GLOBE provides the ability to view and interact with data measured across the world. Select the visualization tool to map, graph, filter and export Land Cover Classification data that have been measured across GLOBE protocols since 1995. These screenshots show the steps.

Link to step-by-step tutorials on Using the Visualization System will assist you in finding and analyzing GLOBE data: PDF verson PowerPoint version

A. What is Canopy Cover and Ground Cover?
B. Why collect Canopy Cover and Ground Cover data?
C. How your measurements can help.
D. How to collect your data.
E. Entering data on GLOBE Website.
F. Understand the data.
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H. Additional information

Visualize and Retrieve Data: Select Range of Dates

Select the date for which you need Land Cover Classification data, add layer and you can see where data is available.

Locations where Land Cover Classification data is available for the week you selected

Link to step-by-step tutorials on Using the Visualization System will assist you in finding and analyzing GLOBE data: PDF verson PowerPoint version

A. What is Canopy Cover and Ground Cover?
B. Why collect Canopy Cover and Ground Cover data?
C. How your measurements can help.
D. How to collect your data.
E. Entering data on GLOBE Website.
F. Understand the data.
G. Quiz yourself.
H. Additional information

Visualize and Retrieve Data: Accessing Data

Select the date for which you need Land Cover Classification data, add layer and you can see where data is available.

Link to step-by-step tutorials on Using the Visualization System will assist you in finding and analyzing GLOBE data: PDF verson PowerPoint version

A. What is Canopy Cover and Ground Cover?

B. Why collect Canopy Cover and Ground Cover data?

C. How your measurements can help.

D. How to collect your data.

E. Entering data on GLOBE Website.

F. Understand the data.

G. Quiz yourself.

H. Additional information

Understand the DATA You Collect:

The Canopy Cover and Ground Cover Field Guide Protocol gets us one step further toward being able to determine the correct MUC Class of the sampling site.

The MUC Field Guide: A Key to Land Cover Classification is available for download on mobile devices- consult your app store.

A. What is Canopy Cover and Ground Cover?
B. Why collect Canopy Cover and Ground Cover data?
C. How your measurements can help.
D. How to collect your data.
E. Entering data on GLOBE Website.
F. Understand the data.
G. Quiz yourself.
H. Additional information

Review questions to help you prepare for the Canopy Cover and Ground Cover Quiz:

1. **Canopy Cover and Ground Cover are part of what set of GLOBE Biosphere Protocols?**
2. **What environmental factors influence canopy cover?**
3. **Why is documenting Canopy Cover important?**
4. **What land cover classification scheme does GLOBE use, in order to ensure comparisons between sample sites around the globe?**
5. **Canopy cover can be best understood as the view of vegetation from what perspective?**
6. **When is the best time to conduct canopy cover and ground cover measurements?**
7. **What instrument will you use to conduct canopy cover measurements?**
8. **How do you determine where to sample your data in the field- how do you set up half transects?**
9. **How do you determine the length of your pace?**

A. What is Canopy Cover and Ground Cover?
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Frequently Asked Questions:

- **What should we do if there is a multi-storied canopy?**
- If there is a multi-story canopy, try to identify the highest level of the canopy without changing your position. If the vegetation touches the intersection of the crosshairs, mark a (+).

- **What if the entire circle I see through the densiometer is full of vegetation, but there is no vegetation at the crosshairs?** This is a sampling question. The Land Cover/Biology Team has chosen the intersection of the crosshairs as the sample. Therefore, this would be a (–).

- **What if we can't get to our site during peak vegetation (full leaf-on) conditions?**
- If you cannot get to your site during peak growth (leaf-on), measure your site during the leaf-off period and try your best to get the peak growth (leaf-on) data, when you can.

A. What is Canopy Cover and Ground Cover?
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Question for Research Investigations

Once you have used this data to determine the MUC class, there are a number of questions that you can explore:

- What natural changes could alter the MUC class of these sites?
- Is this MUC class typical for its latitude, longitude and elevation?
- If someone only had photos of your site, what MUC class would he/she think this site is?
- What other MUC classes are most similar to your site?
- How will the land cover of your site affect local climate?
- How will the land cover at your site affect your local watershed?
- If you compared a Landsat image from ten years ago to one from today how do you think they would differ?
- Does the nearest water body affect the vegetation of this site?
- What types of animals do you think live here?
- How are the land cover and soil characteristics of this site related?
- How are the land cover and soil characteristics related?

A. What is Canopy Cover and Ground Cover?
B. Why collect Canopy Cover and Ground Cover data?
C. How your measurements can help.
D. How to collect your data.
E. Entering data on GLOBE Website.
F. Understand the data.
G. Quiz yourself.
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Questions about content in the module? Contact GLOBE eTraining: rlow@ucar.edu

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