

A photograph of a forest stream. The water is clear and flows over rocks. The banks are covered in moss and ferns. The trees are tall and thin, with sunlight filtering through the canopy.

Carbon Cycle Introduction

Read the module content and take the test that follows to earn the GLOBE Biosphere: Carbon Cycle certificate.



A. Overview

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Biosfera

Biosferu čine sva živa bića na Zemlji. Jedan od načina promatranja biosfere u GLOBE-u je istraživanje osnovnog kemijskog elementa koji je izgrađuje – ugljika. Ugljik igra i značajnu ulogu u regulaciji klime na Zemlji. Istraživanjem želimo bolje razumjeti odnos između pohranjenog ugljika u biljkama i klime.

Tijekom razvoja ljudskog društva, ciklus ugljika je narušen te se smatra jednim od glavnih uzročnika klimatskih promjena.

GLOBE ciklus ugljika sadrži različite kategorije

- (1) Uvodne aktivnosti (Learning Activities)
- (2) Praktični radovi u učionici (Plant-A-Plant)
- (3) Mjerenja količine ugljika na postaji GLOBE (Protocols)



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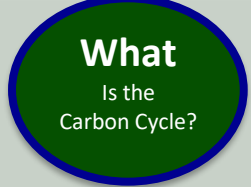
G. Quiz Yourself

H. Additional Information

Ugljik

- Osnovni element živih bića
- Čini 45-50% ukupne mase biosfere
- Prisutan je i u atmosferi , tlu , oceanima, u Zemljinoj kori
- Ciklus ugljika karakterizira kretanje ugljika između Zemljinih sfera.
- Regulator je Zemljinog klimatskog sustava
- Centralni je dio ekosistema.



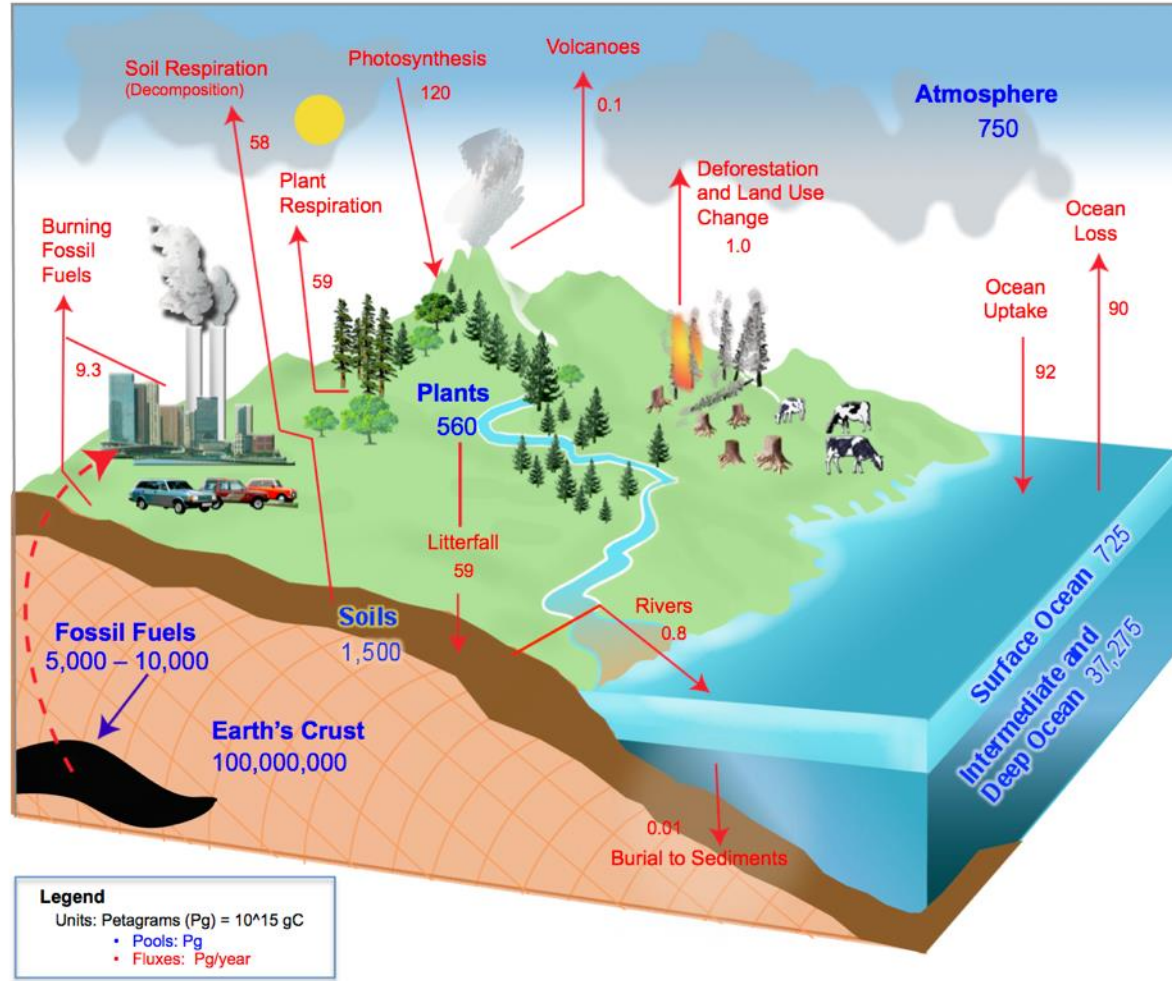


What

Is the Carbon Cycle?

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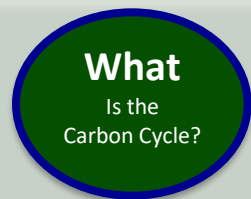
Ciklus ugljika



Legend
 Units: Petagrams (Pg) = 10¹⁵ gC
 • Pools: Pg
 • Fluxes: Pg/year

Bazeni ugljika:
 Mjesta gdje je pohranjen, mjereno u Petagramima (Pg)
 10¹⁵ gC

Cirkuliranje ugljika:
 Kretanje ugljika Petagrami/godina



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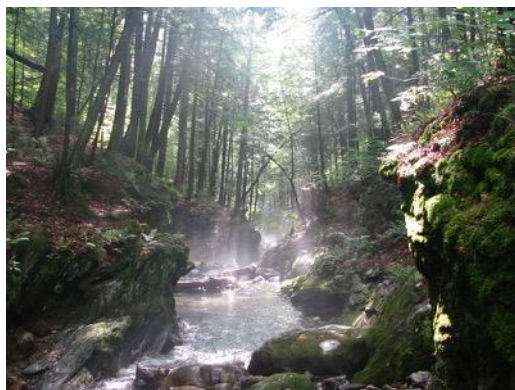
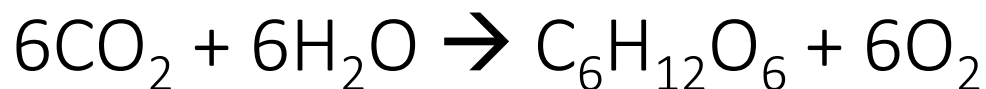
F. Introductory Activities

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Kako biosfera utječe na količinu CO₂ u atmosferi?

fotosinteza

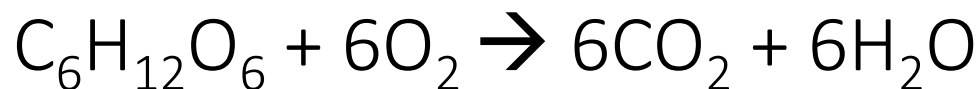


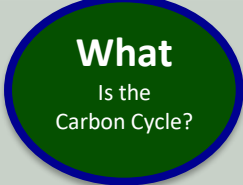
Biosfera



Atmosfera

Respiracija/stanično disanje





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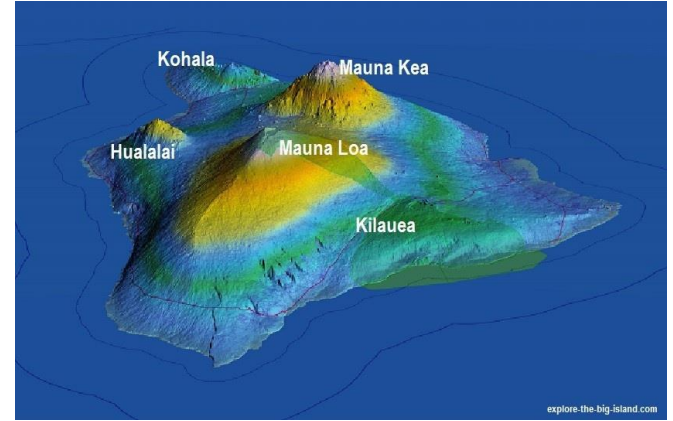
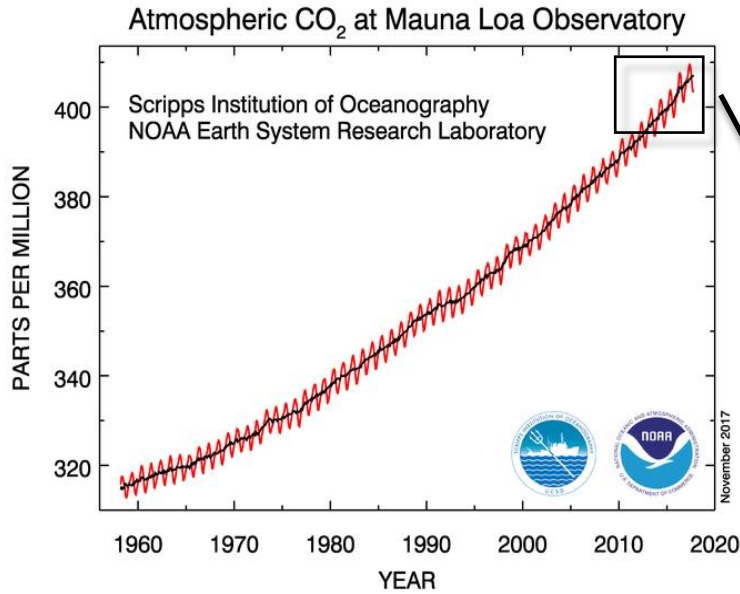
D. What is the Carbon Cycle?

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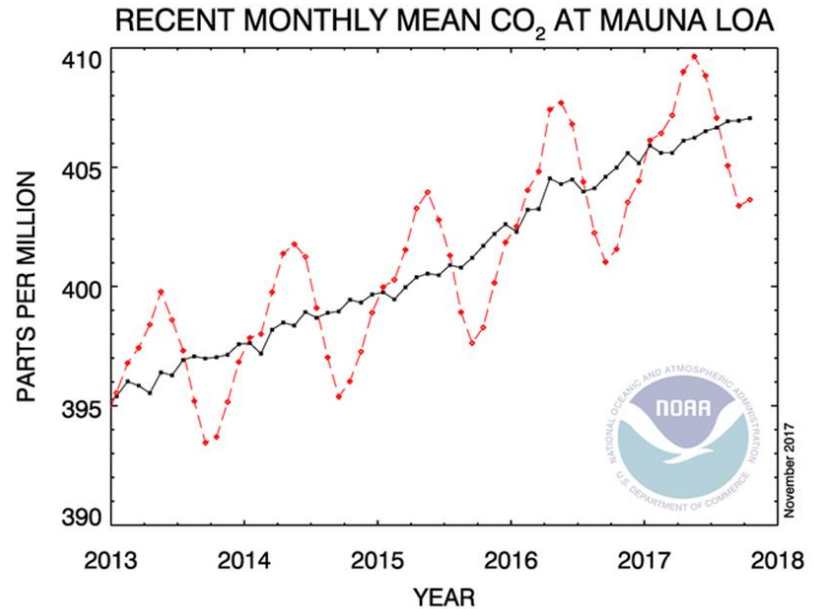
G. Quiz Yourself

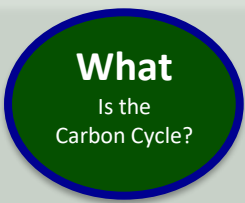
H. Additional Information



Prema istraživanjima
količina CO₂ u
atmosferi danas je 40%
veća nego pred 800000
godina.

Image: ersl.noaa.gov





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Ledeni pokrov čuva atmosferu iz prošlosti u obliku malih mjehurića.

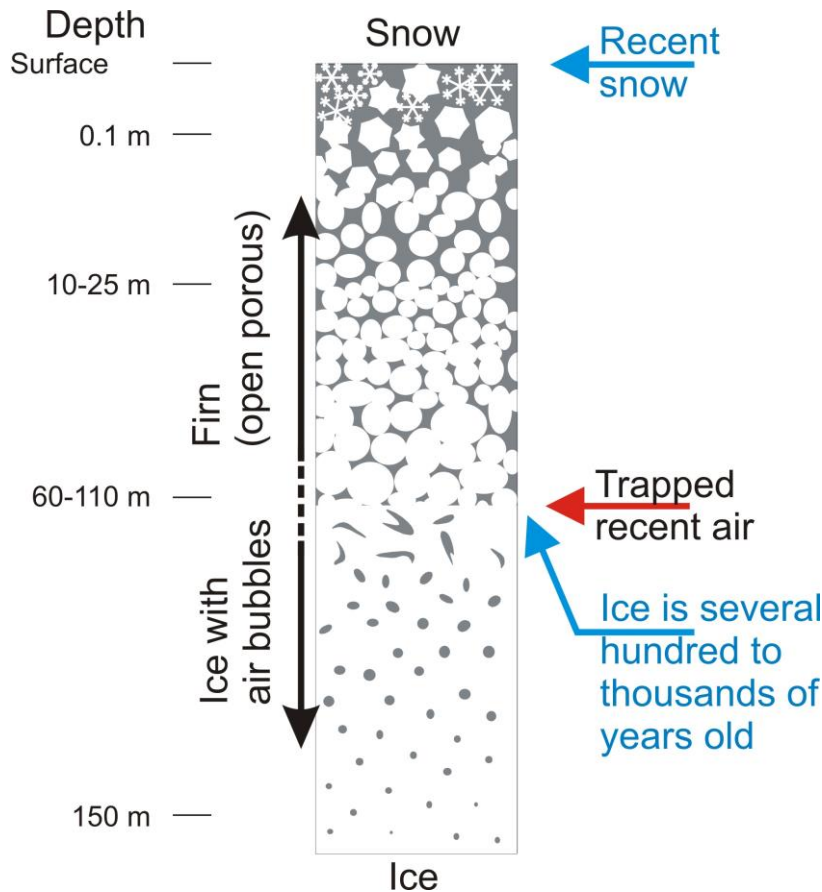


Image: Niels Bohr Institute



Image: Bernhard Bereiter



Biosphere



Carbon Cycle

Introduction



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Protocol eTraining - GLOBE.gov

globe.gov/get-trained/protocol-etaining/etraining-modules/16867717/3099387

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English

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In-Person Workshops
Protocol eTraining
Using the GLOBE Website

Protocol eTraining

- Atmosphere
- Biosphere
- Hydrosphere
- Pedosphere (Soil)
- eTraining Requirements
- Discussion Forums

INTRODUCTION TO BIOSPHERE

This module provides an introduction to the Biosphere investigation. You will learn how to conduct GLOBE's biosphere protocols so that the data you collect is of appropriate precision and accuracy. You will learn about the MUC classification system used to classify land cover at our study site, and get an overview of the biometry and phenology field procedures. You will also review the steps you will take to upload your observations to the GLOBE database and visualize data using the GLOBE Visualization system.

Download Module Assessment Test **Test not completed**

REGULAR MODULES

https://www.globe.gov/get-trained/protocol-etaining



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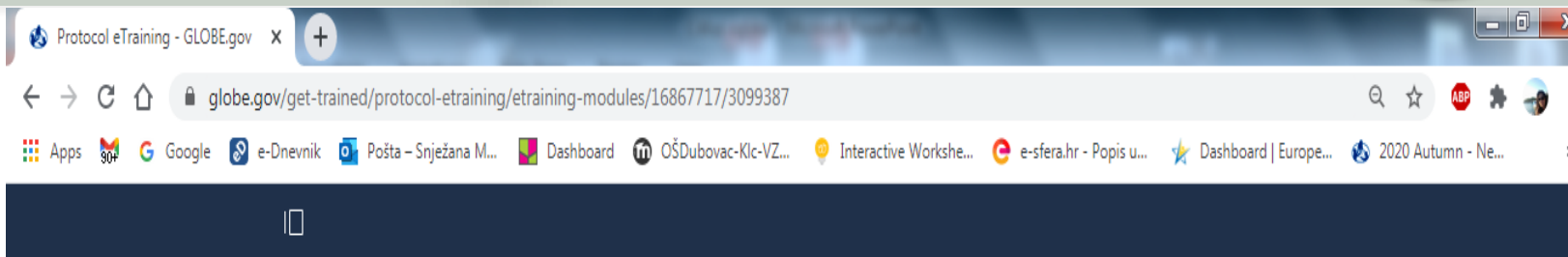
D. What is the Carbon Cycle?

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Standard Site Carbon Cycle Protocols

Learn how to set up a STANDARD Carbon Cycle Site to take carbon and plant growth measurements using the GLOBE Carbon Cycle Protocols. A Standard site is an area of at least 225m² (15x15m) of contiguous vegetation (i.e. forest, grassland, shrubland), if your site has human interference (i.e. school yard, park, etc.) please complete the NON-STANDARD Protocol eTraining. This module reviews learning activities and research questions that you can address using the Carbon Cycle protocols, the selection of a Standard GLOBE Carbon Cycle site, and provides a step-by-step introduction of the Standard Tree, Shrub/Sapling, and Herbaceous protocols. After completing this module, you will be able to determine which vegetation types you will measure, perform field measurements to assess carbon storage and plant growth, upload data to the GLOBE database, and understand resources available to help you analyze and interpret your data.

[Download Module](#)[Assessment Test](#)

Test not completed

Non-Standard Site Carbon Cycle Protocols

Learn how to set up a NON-STANDARD Carbon Cycle Site to take carbon and plant growth measurements using the GLOBE Carbon Cycle Protocols. A Non-Standard site is an area of at least 225m² (15x15m) of vegetation with some human interference (i.e. school yard, city block, park), if your site has contiguous vegetation (i.e. forest, grassland, etc.) please complete the STANDARD Protocol eTraining. This module reviews learning activities and research questions that you can address using the Carbon Cycle protocols, the selection of a Non-Standard GLOBE Carbon Cycle site, and provides a step-by-step introduction of the Non-Standard Tree, Shrub/Sapling, and Herbaceous protocols. After completing this module, you will be able to determine which vegetation types you will measure, perform field measurements to assess carbon storage and plant growth, upload data to the GLOBE database, and understand resources available to help you analyze and interpret your



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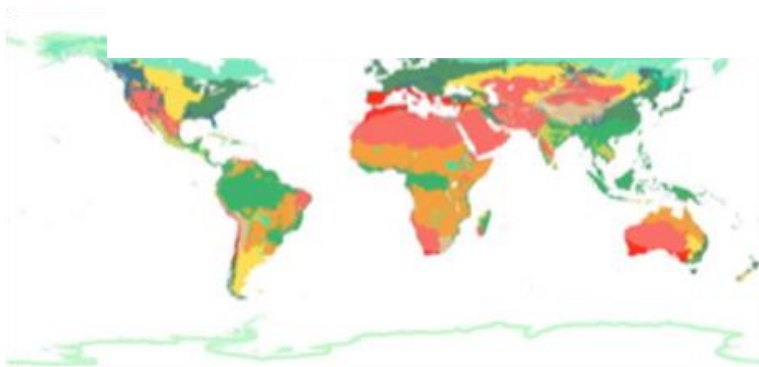
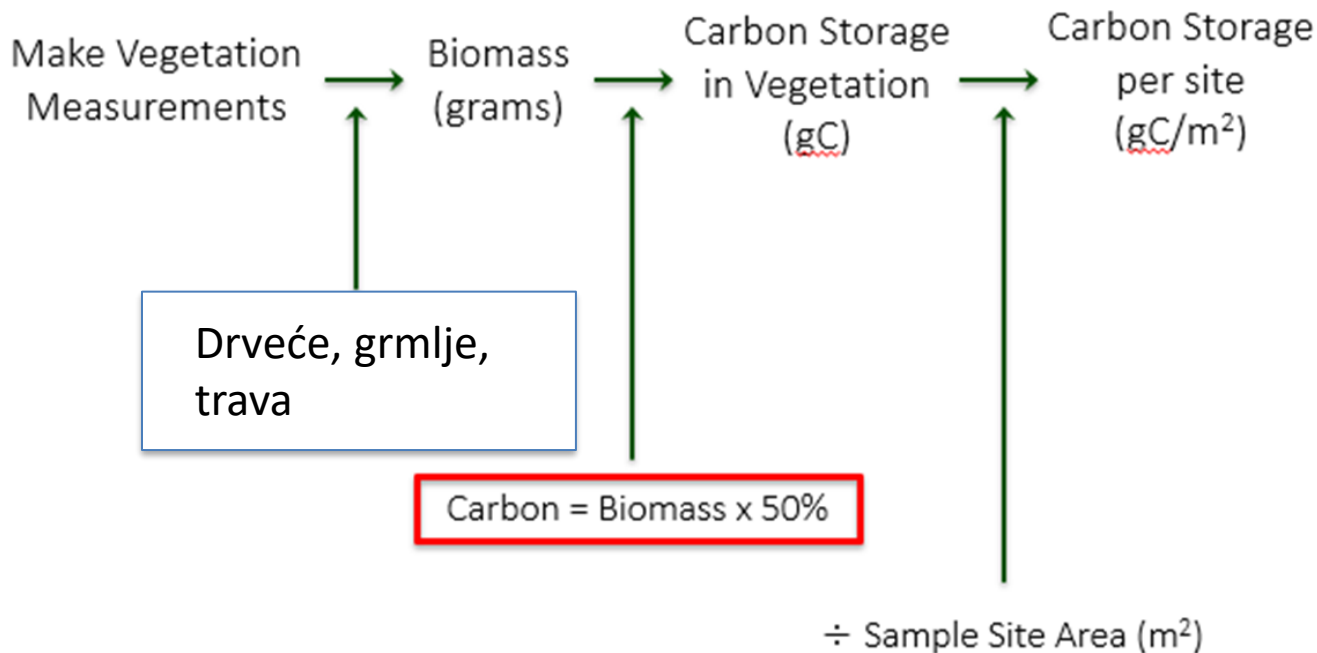
E. Why Collect Carbon Cycle Data?

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Kako se izračuna količina ugljika?





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Odabir postaje

Odrediti vrstu postaje

Standard Site (standardna postaja) – prostor od najmanje 225 m² (15m x 15m) homogene vegetacije (šuma , travnjak, makija...) Najbolje bi bilo ako je moguće mjeriti na području 30 m x 30 m (900 m²). Mapiranje područja i mjerenje.

Non-standard Site (nestandardna postaja) – prostor veličine 225 m² (15m x 15m) s vegetacijom koja raste uz ljudsko djelovanje (npr. gradski park, stambeno područje, prostor oko škole).



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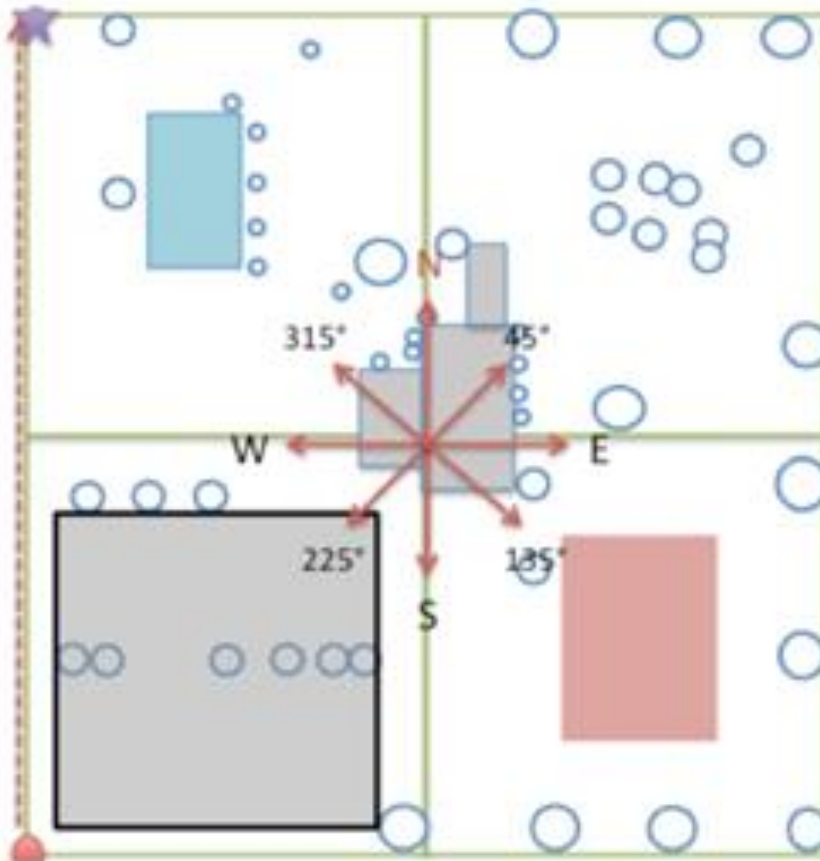
E. Why Collect Carbon Cycle Data?

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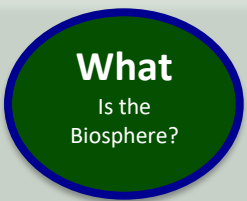
H. Additional Information

Učenci na terenu označuju prostor kojeg mjere, određuju geografske koordinate, mjere opseg drveća, fotografiraju.



Ako je broj drveća manji od 150 na vašem promatranom području, onda se može promatrati cijelo područje (npr. park)

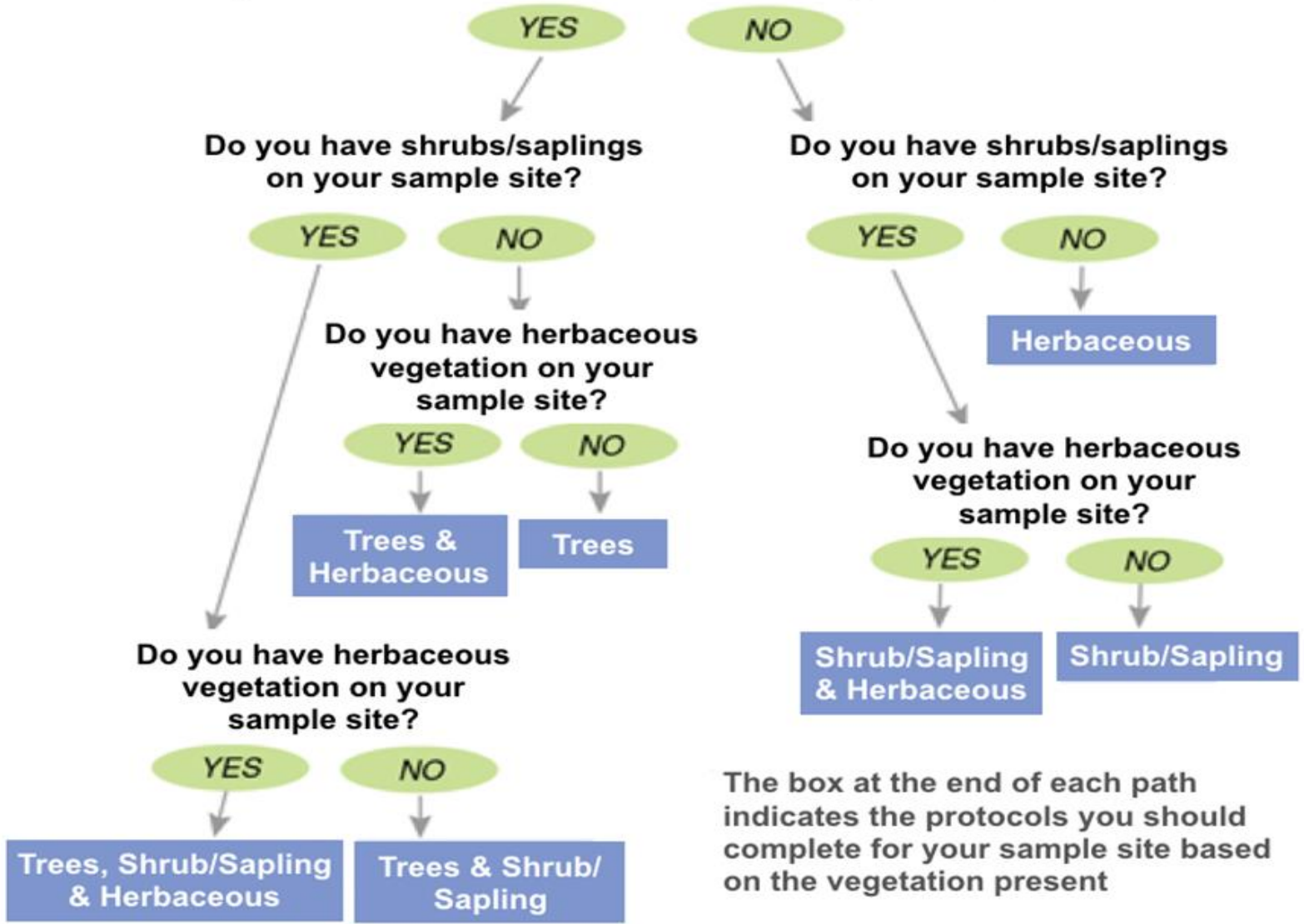
Ako je broj drveća veći od 150, onda se izabere jedno ili dva manja područja.



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Do you have trees >15 cm circumference on your sample site?



The box at the end of each path indicates the protocols you should complete for your sample site based on the vegetation present



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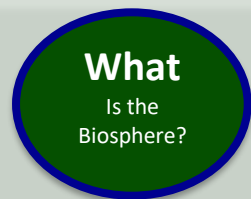
G. Quiz Yourself

H. Additional Information

Protokol : drveće na postaji

<u>How to Measure Trees</u>	Mjerna traka, kalkulator
<u>Tree Mapping</u>	Mjerna traka, kompas, GPS , ključ za određivanje vrste drveća , radni list
<u>Tree Circumference</u>	Mjerna traka , radni list

Tree #s:				Collection Year #: 1
			Date:	2011
Tree #	Notes	Specific Scientific Name	Species Group	CBH (cm)
NE 1	Red Maple	Acer rubrum	Maple Oak	60



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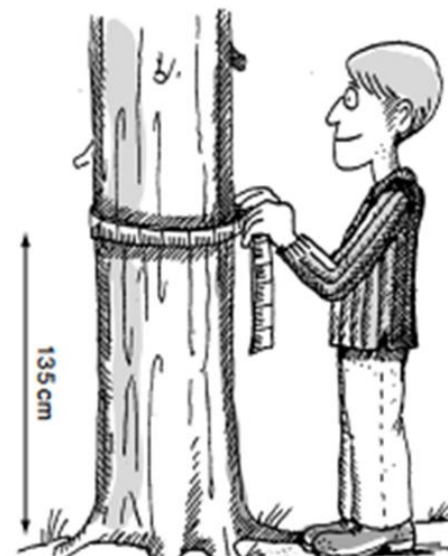
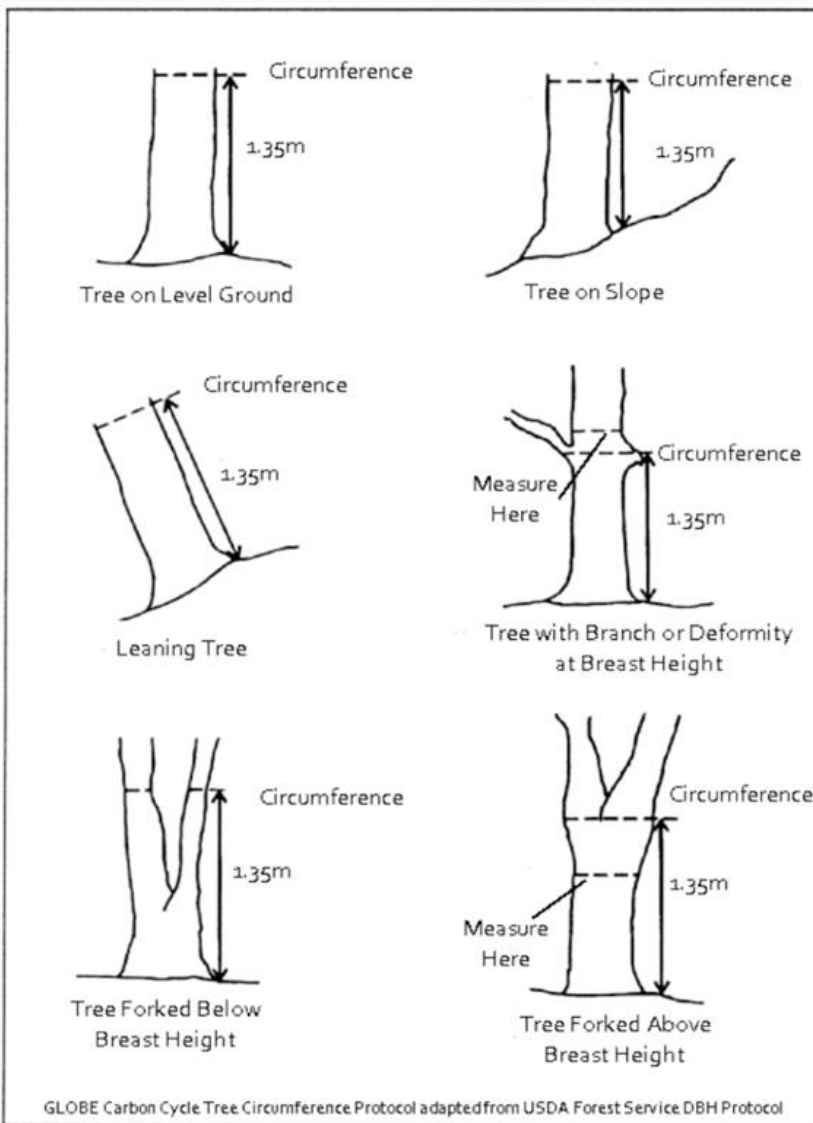
D. What is the Carbon Cycle?

E. Why Collect Carbon Cycle Data?

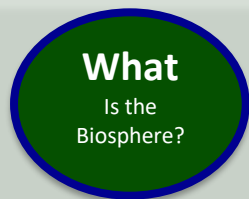
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Kad se pošalju podatci u GLOBE , oni će se automatski preračunati.



What
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[Live Data Entry](#)

Data Entry at globe.gov

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THE GLOBE PROGRAM **SCIENCE Data Entry** Welcome Snjezana Marković-Zoraja

Data Entry Home / OS Dubovac /

Site Definition ?

Add site type

Atmosphere

Atmosphere

Surface Temperature

Hydrosphere

Hydrology

Biosphere

Land Cover

Greening

Phenological Gardens

Liacs

Carbon Cycle

Pedosphere

Frost Tube

Soil Characterization

Soil Moisture and Temperature

Site Name * * indicates a field is required

Carbon cycle- schoolyard

Coordinates

Latitude * °

Longitude * °

Elevation * m


North South East West

Source of Coordinates Data * GPS Other

[Set elevation](#)

Karta

Satelit





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Add site type

Atmosphere

Atmosphere

Surface Temperature

Hydrosphere

Hydrology

Biosphere

Land Cover

Greening

Phenological Gardens

Lilacs

Carbon Cycle

Pedosphere

Frost Tube

Soil Characterization

Soil Moisture and Temperature

Photos →

Comments

Optional

- Carbon Cycle | ✕ Remove

Comment

Site Description (check all that apply) *

Site contains trees > 15 cm in circumference

Site is more than 25% covered with shrubs

Site is more than 50% covered with herbaceous vegetation

Site Shape *

Standard (square, rectangle, circle)

Non-Standard

Total Area of the Site (m²) *

225

VAŽNO:

1. odabrati standard ili nestandard protokol
2. Označiti vegetaciju koju mjerimo
3. Upisati površinu u m²



Biosphere



Carbon Cycle

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Add site type

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Atmosphere

Surface Temperature

Hydrosphere

Hydrology

Biosphere

Land Cover

Greening

Phenological Gardens

Lilacs

Carbon Cycle

Pedosphere

Frost Tube

Soil Characterization

Soil Moisture and Temperature

Photos →

Comment

Urban area, school park (yard) in front of the school building.
Located north of the main entrance to the school building.

MUC Description

Urban

Areas developed for residential, commercial, industrial, or transportation uses. Must be greater than 40% urban land cover.

MUC Code *

91

MUC code - obavezno

Create Site

Reset

THEGLOBEPROGRAM SCIENCE Data Entry

Data Entry Home / North Country Education Services (NCE) GLOBE - School / test carbon site

Welcome Elizabeth Burshovek

Add site type

Atmosphere

Atmosphere

Surface Temperature

Hydrosphere

Hydrology

Biosphere

Land Cover

Greening

Phenological Gardens

Lilacs

Standing Carbon

Pedosphere

Frost Tube

Soil Characterization

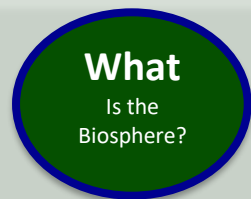
Soil Moisture and Temperature

Photos →

Photo Date: 2018-08-07

No image

North No image	South No image	East No image
West No image	Upward No image	Downward No image



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Upisivanje podataka

THE GLOBE PROGRAM SCIENCE Data Entry English Welcome Snježana Marković-Zoraja

- + [Atm.surface.temp.Dubovac](#)
Latitude 45.4884, Longitude 15.5335, Elevation 111m, SITE_ID: 139040 [Edit site](#) | [Delete site](#)
- + [atm.jorgovan](#)
Latitude 45.4884, Longitude 15.5335, Elevation 111m, SITE_ID: 147068 [Edit site](#) | [Delete site](#)
- + [Betula.TreesGLOBEcampaign](#)
Latitude 45.491684, Longitude 15.537771, Elevation 111m, SITE_ID: 178514 [Edit site](#) | [Delete site](#)
- + [Juglans.regia.Trees.campaigne](#)
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- + [Juglans.regia1Treescampalgne](#)
Latitude 45.492, Longitude 15.5386, Elevation 111m, SITE_ID: 216629 [Edit site](#) | [Delete site](#)
- + [Schoolyard.Trees.evergreen](#)
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- [Carbon cycle- schoolyard](#)
Latitude 45.49153, Longitude 15.537869, Elevation 111m, SITE_ID: 226376 [Edit site](#) | [Delete site](#)

Carbon Cycle

Carbon Cycle ★
New observation Past observations

Land Cover

Biometry ★
New observation Past observations

Carbon Cycle *Creating*

Measured on date

YYYY-MM-DD





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Tree #1 Select Species Group *

Pine ▼

- AspenAlder
- CedarLarch
- DougFir
- FirHemlock
- Maple Oak
- MixedHardwood
- Pine
- SoftMapleBirch
- Spruce
- Woodland
- LowWoodDensitySpecies
- MediumWoodDensitySpecies
- HighWoodDensitySpecies

Select Genus and Species *

Picea ▼ excelsa ▼

Comments

Tree #2

CBH ⓘ

93 cm

Common Name

spruce

Select Genus and Species

Picea ▼ excelsa ▼

Comments



Biosphere



Carbon Cycle

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CBH Select Genus and Species

Common Name Comments

Tree #3 Select Species Group

- AspenAlder
- CedarLarch**
- DougFir
- FirHemlock
- Maple Oak
- MixedHardwood
- Pine
- SoftMapleBirch
- Spruce
- Woodland
- LowWoodDensitySpecies
- MediumWoodDensitySpecies
- HighWoodDensitySpecies

Select Genus and Species

Comments

Tree #4



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Tree #3 Select Species Group

AspenAlder
 CedarLarch
 DougFir
 FirHemlock
 Maple Oak
 MixedHardwood
 Pine
SoftMapleBirch
 Spruce
 Woodland
 LowWoodDensitySpecies
 MediumWoodDensitySpecies
 HighWoodDensitySpecies

Select Genus and Species
 Larix decidua

Comments

Tree #4

SoftMapleBirch

CBH cm

Select Genus and Species
 Betula pendula

Common Name

Comments



Biosphere



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Data Entry Home / OS Dubovac / Carbon cycle- schoolyard / Carbon Cycle

😊 Observation created successfully. [Print this submission](#), [view observations](#) or [create a new one](#).

Carbon Cycle *Editing*

Measured on date

2020-12-11

* indicates required sections or fields

evaluacijski upitnik

<http://bit.ly/3ifOqP1>