



— *virtual field trip* —

BIOSPHERE 2

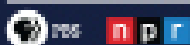
RAINFOREST

Teacher Guide



Digital Learning

ARIZONA
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THE UNIVERSITY OF ARIZONA
Biosphere 2

Overview

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Locations within the Virtual Field Trip

click to visit page

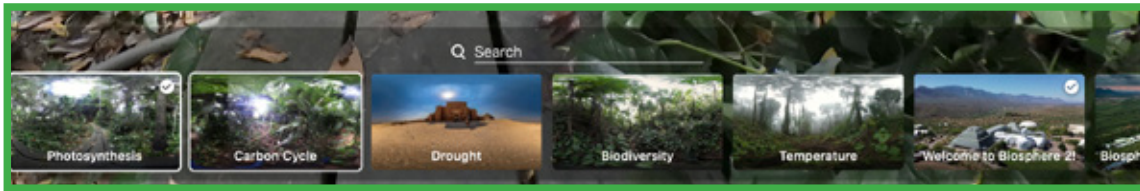
Welcome to Biosphere 2: Building Background Knowledge
Biosphere 2: The Past & Present
Photosynthesis
The Carbon Cycle
Temperature
Drought
Biodiversity



The Biosphere 2 Virtual Field Trip was created to bring students into the wonders of this experimental space. In this field trip we explore the Rainforest biome and provide a variety of learning tools for students to connect to the projects and experiments conducted both within the Biosphere2 as well as in Biosphere1 (Earth!) while learning about systems such as photosynthesis and the carbon cycle.

Biosphere2 is uniquely positioned to conduct experiments that can be done in a simulated setting as a way to evaluate possible outcomes and interventions in the real world and viewers will have several opportunities to learn more about the research happening now and in the past. Experimentation with drought, with temperature, and CO₂ levels help us understand more about climate change and what the future holds for Planet Earth.

Students will explore concepts that help forge connections to the real world and focus on problem identification, experimentation and possible solutions. Each location is centered around themes that bring climate change into a broader conversation. Most importantly, each location shares threats but also actions that can be part of a solution to combat rising temperatures and other effects of climate change. This is also a great opportunity to address local issues and solutions.



Navigation & Accessibility Features



Viewers will move between locations with the green arrows. Everyone begins in the *Introduction to the Biosphere 2* location and will then pass into the Rainforest locations. Once there, movement is guided by the green arrows. There is also the option to move around to other locations using the layered square icon at the bottom

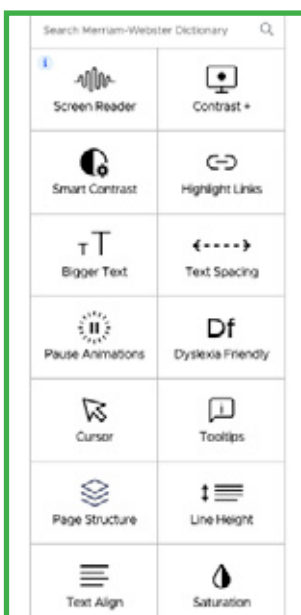
right. This will bring up the navigation bar shown at the top of this page.

Viewers are encouraged to explore, to click, to read, to revisit, and to pass through all of the locations. Each location is listed below with central themes so that instructors can choose to highlight one or more areas that align with the curriculum.



Accessibility Features: *Students can hear the text being read with the icon to the top right of the text frame.*

Using the icons at the top right of the text reader, viewers can control the voice speed and type, font size, and can translate the text into many different languages.



ThingLink Accessibility Player

This link provides an [accessible version](#) of the Biosphere 2 Virtual Field Trip that works with screen readers. There are a variety of controls shown below and they include dyslexia-friendly viewing, adjustable contrast, adjustable cursor size, reading mask, screen reader, and more.



Arizona Standards Addressed

Core Ideas of Knowing Science

Physical Science Core Ideas

P4: The total amount of energy in a closed system is always the same but can be transferred from one energy store to another during an event.

Earth and Space Science Core Ideas

E1: The composition of the Earth and its atmosphere and the natural and human processes occurring within them shape the Earth's surface and its climate.

Life Science Core Ideas

L2: Organisms require a supply of energy and materials for which they often depend on, or compete with, other organisms.

L4: The unity and diversity of organisms, living and extinct, is the result of evolution.

The Core Ideas of Using Science

U1: Scientists explain phenomena using evidence obtained from observations and or scientific investigations. Evidence may lead to developing models and or theories to make sense of phenomena. As new evidence is discovered, models of theories can be revised.

U3: Applications of Science often have both positive and negative ethical, social, economic, and/or political implications.

Broad Standards

Grade 3- Understanding systems, systems models, structure and function involving energy and 1 matter

Grade 4- Apply systems and system models: energy and the availability of resources affects - Earth systems (geosphere and biosphere). Emphasis on stability and change

Grade 5- Micro level changes in matter - genetic information

Grade 6- Cycling of matter, energy flow, and scale: molecules, geosphere, ecosystems

Grade 7- How energy transfer impacts geologic and atmospheric processes

Grade 8- Cause-and-effect interactions and effect on stability and change to influence the natural world

Suggestions for Use in the Classroom

The Biosphere2 Virtual Field Trip offers many opportunities for engagement and interaction. This could be a 20-minute experience, but it could also span several days to a week if you choose to utilize the resources included in the locations for instruction. Each location description is listed below, including a list of each interactive element, the type of element, and estimated time for viewing.

As an introduction, you can watch [Biosphere 2 Orientation Video](#) (14:12). This gives a comprehensive overview of the Biosphere 2; it provides a brief look into the biomes, the research that address real-world problems, and the role of research in helping to solve some of these issues. Many of the concepts mentioned in the video are examined in greater depth in this Virtual Field Trip.

Suggested Activities

- » Allow students to click through the elements in one or more of the locations to gain an overview of what information is shared.
- » Assign one location for students to utilize as a supplementary resource, allowing more time for interacting with the concepts.
- » Students can document learning through scientific writing and science journals. They can write about phenomena they identify, questions and wonderings, and can sketch and diagram as well.
- » Students can create their own diagrams of the systems presented in the locations (carbon cycle, photosynthesis, the water cycle, food webs, etc.).
- » Utilize the resources available in a study on climate change, research in the Biosphere 1 and 2, and conduct or participate in a citizen science project locally.
- » Use the Threats and Actions in each location to extend the lesson and include research of both global and local issues. Topics could include invasive species, water shortages, increasing temperatures and the specific impacts on humans and the greater ecosystem.
- » Arrange for a field trip to the Biosphere 2 and prepare by having students brainstorm questions after completing one or more locations within the rainforest.

Welcome to Biosphere 2: Building Background Knowledge

The introductory page provides an overview of the primary biomes in Biosphere 2.

It may be helpful to preview this section together as a class, or review before having students enter the Rainforest. An understanding of Biosphere 2 as a unique research space (both in the past and in the present) will allow students to develop a better understanding of some of the underlying scientific concepts they will explore in the Rainforest.

Begin with Construction and Ownership Video (3:33)

The introductory video is an excellent orientation to Biosphere2, past and present. It provides history of the construction, a brief overview of Missions 1 and 2 and challenges they encountered, and the eventual transition of the Biosphere 2 to the University of Arizona.

The Biosphere 2 Building

This section provides an overview of the primary Biosphere 2 building: the different mesocosms, biomes, mechanical spaces, and the Mission 1 and 2 living spaces. Each features images, a short video, and a brief description. (Text + images, 5:00 min)

- » Tropical Rainforest
- » Ocean
- » Upper Savanna
- » Mangrove Marsh
- » Desert
- » South Lung
- » LEO: Landscape Evolution Observatory (formerly used for agriculture)
- » The Human Habitat



Biosphere 2: The Past and the Present

This page provides additional information about the Biosphere 2 and the surrounding area. Items can be clicked on in any order.

The Surrounding Area, Missions 1 and 2, and Current Research

From the lower left orange icon, moving counterclockwise:

- » **Space Biosphere Ventures:** Construction: *(images+text - 2:00 minutes)*
Features images of the building construction and a brief description of the project.
- » **Structural Overview:** *(images+text - 2:00 min)*
Models and inspiration for the Bio 2 structure
- » **Geological History of the Area:** *(image+text - 2:00)*
The Catalina Mountains and other geologic features
- » **Biosphere 2 Site History:** *(images+text - 2:00)*
The transformation of the site through the 1900s
- » **Tucson's Indigenous Peoples:** The Tohono O'odham *(images+text 3:00)*
- » **Tucson's Indigenous Peoples:** The Pascua Yaqui *(images+text 3:00)*
- » **Biosphere 2 Experiment: Missions 1 and 2:** *(images+text - 2:30)*
Images of the original mission inside the Biosphere in the early 1990s.
- » **Biosphere 2 Experiment Outcomes - What Happened?** *(images+text - 3:00)*
Provides an overview of the first Mission, which was compromised due to an imbalance in oxygen and carbon dioxide.
- » **Biosphere 2 Research Today:** *(images+text - 3:00)*
How Biosphere 2 research provides a better understanding of Biosphere 1

Visit the [Biosphere 2 website](#) for more in-depth information about Biosphere 2, the buildings, and the original missions.

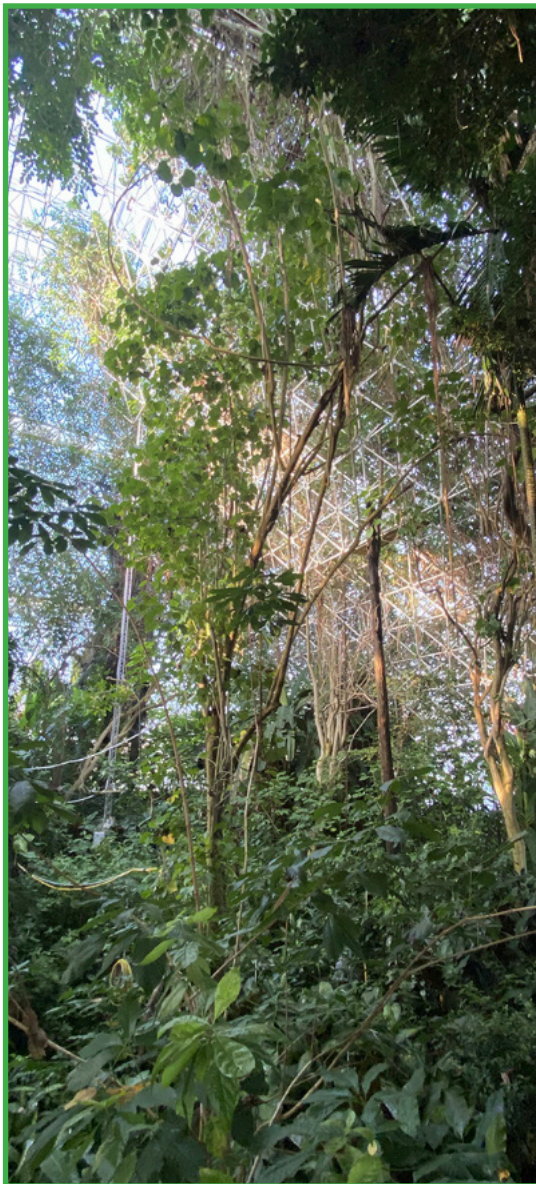
If you would like a longer video that gives a more comprehensive overview of the Bio 2, the biomes, and research conducted that address real-world problems, watch this [Bio 2 Orientation Video](#). Many of the concepts mentioned in the video are examined in greater depth in this Virtual Field Trip.

The Location: Biosphere 2 Rainforest

Photosynthesis (average time: 12-15 minutes)

Learning Goals:

- 1) Learners will explore concepts related to photosynthesis, the role that plants play in keeping our atmosphere oxygenated, and some of the factors that can affect the photosynthetic process.
- 2) In Threats and Actions, they will learn about invasive species in the Sonoran Desert and are encouraged to explore invasive species in their own region.



Vocabulary:

Chlorophyll- A compound that gives plants their green color

Evapotranspiration - the process by which water is transferred from the land to the atmosphere by evaporation from the soil and other surfaces and by transpiration from plants.

Stomates - Stomates (also known as stoma, stomata) are tiny openings, or pores, in plant tissue that allow for gas exchange

Transpiration -The loss of water vapor through the stomata

Invasive species - Any living organism (plant, animal, bacteria, etc.) that is not native to an ecosystem and causes harm

Learning Resources

**** Fun Facts (images :45 sec each x 6)**

Scattered throughout the location, these provide tidbits of information about the Bio2 Rainforest

1) Photosynthesis Basics (images+text - 1:15)

Briefly describes photosynthesis.

Activity: Students could rewrite in their own words and draw their own diagram. **Introduces the term chlorophyll.**

2) What do sugars and photosynthesis have in common? ([PBS LearningMedia Video](#) - 1:45)

Trees, plants, algae, and phytoplankton all do it. Photosynthesis is the process that powers the world.

3) How does leaf size (or no leaves) affect photosynthesis and water loss? (*Images+text* - 1:15)

Also includes a link to [crested saguaros](#), shown in the image.

4) The Water Cycle and Photosynthesis in the Rainforest (*Video* - 1:15)

Evaporation, rainfall, and water that is produced by leaves through photosynthesis.

Includes a clear image at :38 of the process. *Introduces the term stomata and evapotranspiration.*

5) Do leaves breathe? What are stomata? (*Image+text* - 1:00)

Learn about stomata and the role they play in photosynthesis.

6) How are these pictures related? (*Image+text* - 1:45)

Fossilized leaf and gasoline, products of ancient photosynthesis. Provides an overview of where petroleum comes from.

7) Night and Day in the Life of a Leaf (*Graphic* - 2:00 min)

Explains the daytime processes (photosynthesis) and nighttime processes (respiration) that occur in a leaf.

Activity: Students could interpret the graphic - what is it showing and what are their understandings?

8) How leaf size influences photosynthesis (*Images+text* - 1:45 sec)

Activity: Students could explain in their own words how photosynthesis varies based on leaf size, focusing primarily on leaves of desert or other regional plants. *Introduces the term transpiration.*

9) How can light affect the photosynthetic process? (*Video Experiment* - 2:50 min)

This video walks students through an experiment using reverse engineering to see how light affects photosynthesis.

Activity: if you would like to have students conduct their own experiment, the lesson plan is included in the video link.

Threats: Invasive Species (*Images+text* - 1:00 min)

Clearcutting of rainforest land provides space for invasive species.

Activity: Students can investigate some of the 117+ invasive species in rainforests worldwide, including animals. Compare and contrast with *invasive species* in your region.

Actions: What You Can Do: Buffelgrass (*Images+Text+link* - 5:00 min+)

Information about buffelgrass, an invasive species in the Sonoran Desert, and why it is problematic.

Activity: Learn more about buffelgrass. Possible service-learning opportunity & citizen science project. Use the bilingual [Buffel Busters Activity Book](#) from Tucson Clean and Beautiful for other activities and projects.



Carbon Cycle (Average time- 17-20 min)

Learning Goals:

- 1) Learners will be able to identify the basic processes in the carbon cycle.
- 2) Learners will be able to identify natural and human sources of CO₂, where carbon is stored underground, and the role of plants in storing and processing CO₂.
- 3) In Threats and Actions learners will consider the role of palm plantations in rainforest deforestation, weighing information from two different sources.

Vocabulary:

Carbon sequestration -the process of capturing and storing atmospheric carbon

Terrestrial sequestration- CO₂ is captured and stored by plants and within the top 2 feet of the Earth's surface

Sustainably grown - growing food by caring for and regenerating the soil, air, and water. People and animals are also treated humanely.

Learning Resources

** Fun Facts (:45 sec each x 6)

Learn about some tools used for experimentation in the rainforest and get some up-close views

Sounds of an actual rainforest vs. sounds Biosphere2 Rainforest (Audio clips - 2 min)

Describe the differences and how do you account for those differences?

1) Carbon Dioxide and the Carbon Cycle ([PBS LearningMedia Interactive](#) - 4-5 min)

Explore how human activities alter the carbon cycle and cause atmospheric carbon dioxide to increase. Students can compare data from 300 years ago with present day data. Learn about the reservoirs and flows of the carbon cycle and how human activities increase the amount of carbon dioxide in the air and ocean. This increased atmospheric carbon dioxide causes global warming.

2) How do plants work as CO₂ “sinks” video ([PBS LearningMedia: Terrestrial CO₂ Sequestration](#) - 1:30)

Learn about how plants store excess amounts of carbon dioxide from the atmosphere within their roots and cells, known as “sinks.” *Introduces terrestrial sequestration.* There are more videos in this series on PBS LearningMedia.

3) How do plants use CO₂? (Graphic+text - 2 min)

This graphic illustrates the flow of CO₂ and O₂ during photosynthesis. Ask students to describe the cycle as shown in the graphic.

4) What role do rainforests play in the carbon cycle? (Image+text - :45 sec)**5) Carbon cycle interactive diagram (Images+Video - 6-8 minutes)**

A deep dive into the different [terrestrial and atmospheric examples for the carbon cycle](#), distinguishing between carbon stores and processes.

Threats: Deforestation (3 min reading, possible time for research)

Presents causes of deforestation in the Amazon rainforest.

Actions: What Can You Do? Learn more about the rainforest (3 min reading, possible time for research)

Read from differing perspectives about the causes and solutions to rainforest deforestation. Use free databases such as [Gale's Opposing Viewpoints](#) to help students analyze multiple perspectives. This database is free to all Arizona residents through the Arizona State Library. Other state libraries may provide free access to this resource as well.

Activity: Students can create multimedia presentations, reports, comics, or other representations of what they have learned and share with classmates and families.



Temperature (Average time 20-35 min)

Learning Goals:

- 1) Learners will be able to identify the locations and general characteristics of rainforests.
- 2) Learners will gain a better understanding of the scientific research done at the Bio 2 Rainforest as well as the life of a researcher.
- 3) Learners will explore the role of temperature in the rainforest as well as the Bio 2 Rainforest.
- 4) In Threats and Actions, students will analyze temperature data and will learn about data models and how they can be interpreted and analyzed.

Vocabulary

Climatologist- a scientist who studies weather patterns over a period of time

Transpiration-The loss of water vapor through the stomata

Learning Resources

****Fun Fact (Images+text - :45 sec each x6)**

Learn about upcoming research projects, the Biosphere 2 technosphere, and other cool Bio 2 facts.

1) Where can you find tropical rainforests? (Graphic - 1:30)

See the correspondence of rainforest locations to the equator.

2) What do you notice about temperatures in a tropical rainforest? (Graph+text - 1:15)

Included is a link to the [NASA Earth Observatory](#) with additional information about rainforest biomes across the globe.

3) Life of a scientist at Biosphere 2 (PBS LearningMedia video - 7:16)

Learn about the work of Dr. Joost van Haren and his focus as a researcher within the Bio 2 and in the Amazon rainforest. Includes footage from Bio 2 and anecdotes and footage from work in the Amazon. Teacher Guide and discussion questions available to extend the lesson. Also discusses the WALD experiment, explained more in the Drought location.

4) Rainforest Maps from Biosphere 2 (Images+text - 1:30)

Students can view 3 different types of maps of the Rainforest in Bio 2: an architectural rendering that shows the comparative size of the Rainforest compared to the other biomes, a drawing show the heights of the Rainforest, and a surface plot of the zones within the Rainforest.

5) What role does leaf size and shape play in the rainforest? (Images+text - 1:45)

Looking at a variety of leaf sizes and shapes, the size affects transpiration rates. Learners are asked to consider what other factors may affect size and shape, and if different locations in the rainforest canopy might also affect both of these. Reviews the term transpiration.

6) The Biosphere 2 Rainforest Mountain (Video - 4:13)

This video gives an overview of the mountain structure of the Bio 2 Rainforest, addresses the challenges of the internal temperatures, & explains many of the Fun Facts and other information included in the different locations in the Virtual Field Trip.

7) How hot is it in Biosphere 2's Rainforest? (Image+text- 1:45)

Explains that Bio 2 Rainforest temperatures are the inverse of actual temperatures in a Rainforest

8) How can the Biosphere 2 Rainforest contribute to climate studies?

(Image+text - 1:45 + additional optional reading time for the article)

This includes a link to a University of Arizona article, [Rainforest at Biosphere 2 Offers Glimpse into Future of the Amazon](#). This is an advanced article, but could be used as an example of scientific writing for the media.

Threats: Temperature (Text - 5+ minutes, as desired)

Learners will explore data on [NASA's Earth Observatory website](#) and can see 140 years of climate data. There are a variety of visualizations that help learners analyze both patterns and effects of global warming as well as human involvement. Includes a variety of links for exploring the effects of global warming throughout the world. Introduces the term climatologist.

Actions: What can you do about rising global temperatures?

(Text+interactive - 10-15 min depending on how it is used)

This section helps learners analyze graphs and other types of visual data more critically. The tutorial from Eastern Michigan University ([How to Read a Chart](#)) provides an interactive digital exercise about data presentation using graphs, providing instruction on why to use a chart, explores common chart types, how to read a chart, and practice. Information is presented with audio and text.

Activity: Use this tutorial as a whole class discussion piece to investigate different types of charts and how to use them according to the data learners wish to represent. Learners can also be given sets of data and can explore different types of graphic representation.



Drought (Avg. time 35-55 min depending on extra readings)

Learning Goals:

- 1) Learners will explore different causes for drought, including human influence and the global impacts.
- 2) Learners will explore the environmental system used to control the Bio 2 climate.
- 3) Learners will gain an understanding of how experiments can be structured to look at the effects of climate change on the rainforests of the future (the WALD experiment).
- 4) In Threats and Actions, learners will explore fires as a direct effect of drought in the West and Southwest. They will also explore small scale environmental solutions such as rainwater harvesting and agrivoltaics.

Vocabulary

Aridity - Permanent lack of moisture in a region due to low precipitation.

Mitigation - The action of reducing the severity or seriousness of something.

Agrivoltaics - Using areas of land for solar power generation and growing crops beneath panels.

Learning Resources

****Fun Facts (Images+text :45 sec each x9)**

Explore leaves, different levels of the Rainforest, water sources, and experiments

1) What are the causes of drought?

(Image+text+link - 2-10 min depending on info read on the website)

There are many factors contributing to drought conditions and the image shows the effects of deforestation on rainfall and the resulting warmer land surface. This useful graphic can be analyzed at length with students to gain a better understanding of the impact of deforestation on rainfall. The link is to the [National Ocean Service](#) and focuses on El Niño and La Niña climate patterns (includes more useful graphics).

2) What is the Biosphere 2 Water, Atmosphere, and Life Dynamics campaign?

(text+images - 2:15 and link to video about the experiment)

This introduces learners to the 4-month long WALD project to explore how tropical ecosystems respond to drought.

Video: The WALD Experiment: Tracking the effects of drought (video 10:39)

By forcing a drought in the Bio 2 Rainforest for two months, researchers study the impacts of the drought on the soil, on plant parts, including the roots. Following the flow of carbon through the air and the soil, researchers can track the effects of added carbon-13 in the process of photosynthesis.

4) What are some ways scientists study drought? ([PBS LearningMedia video](#) - 6:58)

Explore how scientists collect samples of foliage and use spectral imaging to study levels of drought induced stress in giant sequoia trees in California. Learners will see some connections to the Biosphere 2 Rainforest studies, including how drought is impacting these forests.

5) How does drought differ from aridity? (*Image+text* - 1:45)

This image introduces the term aridity as a permanent, natural phenomenon, contrasted with drought, which is temporary and also potentially impacted by human behaviors.

6) Can you think of possible impacts of drought? (*image+link* - 3+min)

Learners will hypothesize 3-4 human and economic impacts of drought and will then link to the [National Drought Mitigation Center](#) to find out the economic, environmental, and social impacts of drought. Good reading level for middle school. Introduces the term mitigation.

Activity: Investigate how drought impacts learners' communities and analyze possible solutions.

7) Extreme Drought in the Rainforest (*Image* - :30)

The image shows the Rainforest floor cracked and dry after 68 days without water.

8) U.S Drought Monitor (*Embedded website link, updated regularly - 5+ min, pending on desired use*)

Learners can utilize this data to do real-time studies on drought conditions in the U.S. This [website](#) includes a weekly description of drought and weather conditions in all U.S. regions and territories. What do learners notice when reading the map?

9) Does a drought end when it rains? (*Video+text* - 1:30)

This video shows rainfall within the Bio 2 rainforest and addresses the idea that drought is generally a long-term condition that requires rainfall or snowfall over the course of several months.

10) Controlling the Climate Inside Bio 2 (*Video* - 4:35)

Director John Adams shows how the climate inside the Bio 2 Rainforest is controlled, and the benefits of manipulating the weather to study the impact of climate change impacts such as drought. He also discusses different plant adaptive strategies by measuring how much water is taken up by the plant's molecules.

Threats: Drought (*Video+text* - 10+min)

Drought threatens many parts of the world, including the Western and Southwestern states in the U.S. Students can watch a video about the aftermath of the [Bighorn Fire](#), a fire that destroyed thousands of acres of desert and forest. Researchers discuss the impact of fire on an ecosystem as well as nature's resiliency.

Actions: What can you do about drought? (*Images+text* - 5+ minutes)

Passive and active rainwater harvesting and agrivoltaics are examples of small-scale solutions that conserve water and can protect plants from harsh conditions. They are encouraged to investigate agrivoltaics (also studied on the grounds of Bio 2) and different forms of [passive rainwater harvesting](#).



Biodiversity (Average time 20-35 minutes)

Learning Goals:

- 1) Learners will explore many examples of biodiversity in global rainforests, primarily animals but plants as well.
- 2) Learners will analyze a chart to determine biodiverse locations globally.
- 3) Learners are challenged to consider how plants are pollinated in the Bio 2 Rainforest without traditional pollinators.
- 4) In Threats and Actions, learners will explore two different perspectives on palm oil production and whether these plantations are responsible for the destruction of rainforests globally.

Vocabulary

Biodiversity - The variety of life in the world or a particular habitat or ecosystem.

Pollinators - Anything that helps carry pollen from the male part of the flower (stamen) to the female part of the same or another flower.

Species - A class of plants or animals whose members have the same characteristics and are able to breed with one another.

Vertebrates - Animals having vertebrae or backbone such as mammals, fish, amphibians, reptiles, and birds.

Learning Resources

****Fun Facts (Images+text :45 sec each x5)**

Explore information about animals of the rainforest, animals from the original Bio 2 Missions, and other fun aspects of the Biosphere 2 Rainforest

1) Biodiversity in the rainforest (Image+text - 1:00)

Names several different animal species of rainforest animals. Can students name the other animals shown?

2) What does biodiversity look like in the Biosphere 2 Rainforest? (Images+text - 1:15)

The Bio 2 Rainforest began with many varieties of plants and animals. Compared to the Rainforest during the original Missions, the Rainforest looks very different today. Learners can review plant survey plots from 1991-1996 to see the reduction in species. This is an opportunity to talk about graphic representations and what information can be extrapolated.

3) How many species call the rainforests home? (Images+text - 1:15)

Addresses the biodiversity that exists in Earth's rainforests, with estimates between 3-50 million species.

4) What types of pollinators live in the Bio 2 Rainforest? (Images+text - 1:00)

Although the original population in the 90s featured traditional pollinators such as bees and butterflies, now the main pollinators seem to be ants and cockroaches!

5) Bananas: A Few Surprising Facts (Image+text - :45)

Students are asked to hypothesize how these bananas get pollinated inside Bio 2 - this open question should push students to think about how pollination works in different plant species. Bananas actually self-pollinate!

6) How does the structure of a rainforest encourage biodiversity?

(PBS LearningMedia video - 4:03)

Highlights the interactive ecosystems in a rainforest and explores the different attributes and species that live in the different layers of the rainforest: the floor, the understory, the canopy, and the emergent layer. Learners are encouraged to pause the video to study the occasional graphs throughout the video about species surveys in the rainforest. Diversity matters when discussing biodiversity and the ability for species to face challenges.

7) Why are rainforests so diverse? (Graphic+text - 1:30)

This graphic map shows the total combined populations of amphibian, bird, mammal, reptile, and vascular plant species in the world, showing the concentration in the world's rainforests.

8) What rainforest resources do humans depend on? (Images+text - 2:15)

Rainforests throughout the world provide us with many staples that we might take for granted, such as cinnamon, chocolate, bananas, and many more. Learners are encouraged to find out what other products come from the rainforest, such as many medicines.

Threats: Palm Oil (Text+image - up to 15 min, depending on how much they read on the webpage)

Palm oil plantations affect the habitats of animals such as orangutans and account for up to 40% of global deforestation. The webpage from [Rainforest Rescue](#) provides a broad range of questions about palm oil. Students should read with the understanding that there are multiple perspectives about this issue.

Actions: What can you do to preserve biodiversity? (Text+image - up to 15 minutes, depending on how much they read)

This webpage from [Unilever](#), a producer of palm oil, gives students another perspective on deforestation caused by palm oil plantations. Like the above webpage, they need to read with care, looking for the pros and cons of the argument, as well as the statistics cited. They can also look for words or phrases that might indicate bias or jargon used to convince the reader of why sustainable palm oil production is possible.

Last stop:****Eye icon near Threats and Action**

Students are invited to vote on their favorite location (Intro to Bio 2, Photosynthesis, Carbon Cycle, Temperature, Drought, or Biodiversity). We'd love to know what they think!