DISCUSSION GUIDE

Into the Outdoors

A MORE SUSTAINABLE PLANET

GREEN BAY BOTANICAL GARDEN

Natural Resource Science

GRADE LEVELS
6-12

CONTENT AREA
Biology/Life Science

UNIT THEME
Biodiversity

TOPIC
The environmental impact of biodiversity on ecosystems

The following short video follows the elements of the discussion guide and highlights key points for Biodiversity.

A More Sustainable Planet - https://vimeo.com/248390714

ENDURING KNOWLEDGE

Students should know how Biodiversity starts at their own home, and can apply to all aspects of the environment.

Learning Targets:

1. Students should know the difference between biodiverse and monoculture.
2. Students should know how plants produce from abiotic resources.
3. Students should understand the importance of providing diverse native plant species to native insects and wildlife.
4. Students should understand how they can create more biodiversity in their yard.
5. Students should understand what gardening solutions help both the planet and people.
6. Students should understand how they directly affect biodiversity in their home area by choosing to be active or inactive in promoting it.

TEACHER BACKGROUND

History:

Most agriculture in the United States is a monoculture system. Fields may contain all wheat or all corn or all soybeans, and even weeds and insects are suppressed. The goal of monoculture is to have nothing in the field but the crop that was planted. Therefore, the field is devoid of native plants and animal species. There is no diversity in it by design. The only beneficiaries of these fields are the farmer who grows the crop and the person who buys and consumes it. In essence, that is only two people.

In contrast, a healthy natural environment has many species all working together in symbiotic relationships. The plants give food, homes, oxygen and in some cases water to all the organisms that live on or near them. The organisms fill vital roles for the plants such as pollination and seed distribution. Many species benefit from the land's use all at once.

Science and Technology:

Biodiversity is the maximization of plant and animal species in a defined area. Increased biodiversity helps plant and animal communities to be sustainable by increasing the range of environmental tolerance, plant production, nutrient deposition and plant and animal symbiosis in the environment. Each organism plays a role, whether it be production, consumption or decomposition. Specialized roles such as pollination benefits the insect or bird that gets food from flowers, the plant that receives the pollen to make fruit and seeds, and the animal that consumes the fruit or seeds. The diversity in plants provides for homes and forage for animals such as hungry caterpillars. And humans benefit from spending time outdoors, enjoying the sights of the flowers and animals, and eating the foods the plants produce.

Plants produce the energy they need through photosynthesis. In photosynthesis the plant uses the sun's energy to recombine carbon, hydrogen and oxygen from carbon dioxide and water into carbohydrates that all animals can use for food. The process of photosynthesis happens in the plant's chloroplasts which contains the chlorophyll pigment needed to absorb light energy. Chlorophyll is what makes plants appear green.

LEARNING FOCUS

Critical question: *Why create Biodiversity?* Native species depend on diversity to thrive!

What gardening solutions help plants and people? Planting diverse and native focused gardens can provide habitat for animals and plants, but are also easier to care for than exotic plants. Native plants are accustomed to the normal stresses of the climate they naturally live in. Therefore they thrive with little watering or work. They suppress weeds on their own, and attract wildlife to them. Everyone wins!

VOCABULARY:

Biodiversity: the variety of life in the world or in a particular habitat or ecosystem

Monoculture: the cultivation of a single crop in a given area.

Sustainability: the ability to be maintained at a certain rate or level, avoidance of the depletion of natural resources in order to maintain an ecological balance.

Pollinators: a wide range of different types of life forms, which typically require a wide range of habitat conditions in the same region.

Photosynthesis: the process by which green plants and some other organisms use sunlight to synthesize foods from carbon dioxide and water. Photosynthesis in plants generally involves the green pigment chlorophyll and generates oxygen as a byproduct.

Chloroplast: (in green plant cells) a plastid that contains chlorophyll and in which photosynthesis takes place. replacing plants or animals.

Chlorophyll: a green pigment, present in all green plants and in cyanobacteria, responsible for the absorption of light to provide energy for photosynthesis.

Before Viewing One or More of the Selected Videos:

Ask the students to discuss what they currently know about biodiversity and why it is important. It may be helpful to complete a KWL chart, the K and W before the video and the L after the video. (What I Know. What I Want to Know. What I Learned). Also ask them to discuss what they know about the importance of the critical question and how it affects their lives.

You can either create one or use the example on the *next page*

K-W-L Chart

Topic: _____

What I Know	What I Want To Know	What I Learned

VIEWING AND DISCUSSION GUIDE:

Before viewing the video, it may be helpful to create a "guide sheet" for students to take notes on while watching the video. From the Your Teacher Background, select key headings and questions that will help guide students in picking out significant information. Include questions about how the topic could impact their lives and how the topic relates to other areas of science.

Here are some examples

History:

- Consider a wild environment such as a forest or prairie, how many species do you think would live in that one environment? Make a list of all the species you think might live there.
- Contrast the wild environment to a corn field. How many species can you think of that would live in that one environment? Which species may be desirable or undesirable to the farmer who planted the crop?

Conservation and Technology:

- What is biodiversity? If you break apart the word into "bio" and "diversity", what does that tell you? Whre have you heard of those words before, or what do you think they mean?
- What do plants need to grow?
- How do plants help people and animals?

Learning Focus and Critical Questions:

- Is there anything you can personally do to help wild animals?

AFTER VIEWING THE VIDEO

After viewing the video, guide a student discussion about the key points and questions in the Discussion Guide. Also explore what the students Learned and the significance of the topic to their lives.

If the topic is potentially controversial or has different stakeholders involved, divide the students into "user groups". Have the different groups prepare a presentation of their viewpoints or goals for a classroom debate on the topic. Focus the discussion to address the critical questions in the video or key points in the Teacher Background. For expanded learning, give the student groups additional time to prepare posters or media presentations as part of their presentations.

Evaluation:

1. An informal assessment can be made from students' notes and their participation in the before and after viewing discussions.
2. Activities can be assessed using rubrics based on good research, presentation, and material construction.

Extended Learning:

- Complete the L part of the KWL chart after the discussion.
- Have students research the answers to the questions they had in their KWL chart or Discussion Guide that were not covered in the discussion.
- Students can group together and research a sub-topic related to the main topic. These sub-topics could include the following: history, innovation or technology, careers, and impacts on the environment or society. Students have the option on the method to present their findings to the class.