Introduction to the Biodiversity Unit

This unit on biodiversity is designed to help students in the Central Appalachian region better know the plants and animals living in their own backyard and the richness and value of Appalachian biodiversity. Though the unit may stand alone, it is immeasurably enhanced by showing either all or specific clips from the four part documentary: Appalachia: A History of Mountains and People. Showing the film or clips from the film will strongly engage students in their own learning and cause that learning to be deeper and more lasting.

Film Clips to Show before Teaching the Biodiversity Unit
If time does not allow you to show the entire film, showing the clips especially designed for the Biodiversity Unit will help students better understand the rich biodiversity of the mountains. These clips begin with the world renowned scientist and author, Dr. Edward O. Wilson.

Need a refresher on Biodiversity?
Go to http://www.biodiversity911.org/biodiversity_basics/biodiversity_main.html This is the World Wildlife Fund's website for biodiversity education and is an excellent resource for info about biodiversity.

Concepts Taught by the this unit on Appalachian Biodiversity Science
Biology
1. Students will understand that the survival of any given species is not assured. There are a variety of factors (e.g. reproductive success, mutation, availability of resources, competition) that may determine if a species flourishes, declines, or eventually becomes extinct.

2. Students will predict the likelihood of survival for a variety of existing species based upon predicted changes in environmental conditions (e.g., global warming, continental drift) and propose methods to prevent the extinction of species with insufficient ability to adapt.

3. Students will generate possible solutions to real-world problems of endangered and extinct species and predict the impact of a variety of changes.

Social Studies
1. Students will explain how human modifications to the physical environment (e.g., deforestation, mining), perspectives on the use of natural resources (e.g., oil, water, land), and natural disasters (e.g., earthquakes, tsunamis, floods) may have possible global effects (e.g., global warming, destruction of the rainforest, acid rain) in the modern world (1500 A.D. to present) and on the United States.

2. Students will explain how people can develop stereotypes about places and regions (e.g., all cities are dangerous and dirty; rural areas are poor).

A Teacher's Guide to Biodiversity

Lesson One - What is Biodiversity and [1]How Does Organizing Life on Earth Help us Understand it?

Materials: student handout, *What is biodiversity?;* chalk board or equivalent on which to write data
Academic Objective: Students will understand what the word "biodiversity" means and how scientists organize life on Earth.
Vocabulary: biodiversity, species, taxonomy, classification
Essential question: What is biodiversity and how is it measured?
Estimated Time: Approximately 30 minutes

[2]**Instructions:**

1. Have students read the handout, "What is biodiversity and how does it affect me and the place where I live? Spend a few minutes discussing how much life there is on Earth as well as the three types of biodiversity (species, ecosystem and genetic). These are huge concepts so be sure that all students understand them before proceeding with the rest of the unit. Be sure and tell students that they will be measuring biodiversity in a place near their school at the end of the unit.

2. Tell students you are going to talk about how organisms are classified but first you are going to design a classification system for students in your class. Have each student share one thing that is divided into groups (e.g., library books, athletic teams, food in the grocery store, Yellow Pages, etc.). Post the responses. Ask, *Why do you think people organize things into groups? How would you begin to organize things? If you were to organize the students in this class into groups, how might you divide them?* Ask volunteers to develop a system for classifying the rest of the students. When the students have this concept, tell them they are going to use one method of classification sometimes used by scientists. Make sure they understand that the characteristics they choose must be unambiguous. For example, a person either has brown eyes or not and a person is either under 5'6" or above it and a person either has on blue jeans or not.

3. H[3]ave one student think of a way of dividing the students into two groups based on one specific characteristic, but the student is not to reveal to the class what the characteristic is. After the classifier has divided the students into the two groups, ask the other students to guess the characteristic used by the classifier. *What were the clues?* Ask the classifier to develop a chart that reflects the class being divided into the two groups. Example: All Students - boys and girls

4. Ask another student to select a different characteristic to further divide each group. After the classifier has divided the students into the groups, ask the other students to guess the characteristic used by the classifier. *What clues?* Ask the classifier to continue the chart so that it reflects the two groups being divided into more groups with more specific information. Example: All Students – boys, girls - brown hair, not brown hair. Continue to repeat Step 2—only subdividing groups, not shifting people between groups—until the students are broken down into small subgroups.

You should have a chart that looks like this (remember, your students may choose different classifiers to divide the group.)

All Members of the class

Boys				**Girls**			
Brown hair		**Not brown hair**		**Brown hair**		**Not brown hair**	
Glasses	**No glasses**	**Glasses**	**No glasses**	**Glasses**	**No glasses**	**Glasses**	**No Glasses**

4. When this classification has been completed, have students use their positions in the classification chart to identify themselves, For example, Jared is a brown-haired boy; Ashley is a not-brown-hair girl. 5. Repeat Steps 1–4, using different students to choose the characteristics. Thus, each time the system will be new.

OPTION: Have one student leave the area while the groups and subgroups are being formed. Then, ask the student to return and see if he or she can figure out how the class is organized and place him or herself in the group where he or she belongs and explain why

5. Explain that scientists use a similar kind of system to classify all life on earth and then do a standard lesson on taxonomy, the importance of using Latin names and how scientists are now using genetics to refine the "tree of life".

Lesson Two - How do Scientists Measure Biodiversity?

Materials: copies of the student handout, "What is Biodiversity and How Do Scientists Measure it?", copies of the "How Science is Done" sentence (included), four tent stakes, a large ball of twine at least 40 meters song, one meter sections of dowel rods or pvc pipe to make a lightweight square one meter on each side, a very large bag of great northern beans, flip chart for recording data outside.
Advance Preparation: This activity requires some preparation. First construct a sturdy square one meter on each side using pvc pipe or dowel rods. Then, using stakes and string, mark out a ten meter square area on the school grounds near your classroom. Finally count out 1000 beans into a large container.
Academic Objective: Students will understand how scientists use data to build a body of knowledge and how scientists gather data about biodiversity.
Vocabulary: sampling, ground-truthing, data
Essential Question: How do scientists measure biodiversity?
Estimated time: 1 hour to prepare for the sampling activity, 30 minutes for the sentence activity, one class period to prepare for, and conduct the sample.

Instructions:

Part I

1. Make several large font copies of the following "How Science is done" sentence, ***The small green tree frog looked up at the long black snake with white stripes through the sun dappled leaves of the old sycamore tree.*** You need enough copies of the sentence so your class can be divided into groups of about five and each group can have one copy. Cut each sentence into its component words (leave out the period) and put them in an envelope (one envelope per sentence).

2. Put the students into groups and give each group an envelope. Tell them not to open it yet. Tell students you are going to model how scientists gather data and come to conclusions. Have each group open the envelope and pull out only five words. Then have them try and make a sentence out of the words. After a few minutes, have them pull out five more words and, using all the words they have, try to build another sentence. Proceed in this way until all 25 words are used and each group has made one sentence with all the words. Be sure and tell the students that it is okay if their sentences don't make perfect sense.

3. Next have each group read their sentence out loud or write it on the board. Compare sentences. Students will note that the sentences are not necessarily all alike. Ask them to pretend they are scientists and ask what they could do to make sure their sentences were correct? Discuss with students how the nature of science is to continue to gather data even when it is thought the correct answer is already known.

Part II

1. Scatter the beans around the 10 meter square area.

2. Take students to the marked area and ask them to tell you how many beans are in the area. (They will have to guess, of course.) Ask them how they might find out the number of beans more exactly? Listen to the various answers. Students may come up with the idea of sampling by themselves. If not, explain what sampling is and then have students toss the one square meter randomly in the ten meter square and count the beans in the smaller square each time. By averaging the number of beans in each toss, they will begin to get a more concise picture of how many beans are in the larger square.

3. Discuss with students why scientists might want to sample organisms in this way rather than trying to count each one. Explain that the BioBlitz they will do at the end of the unit is very much like a sampling activity.

4. From the student handout, discuss other ways that scientists measure biodiversity and ask why it might be important to have an internationally standardized way to classify their findings.

Lesson Three - What Does my Ecosystem Do for Me?

Materials: Copy of the handouts, "Ecoregional Survey" and "What are Ecosystems and What Services do they Provide for Us?" both included in this lesson. One coffee can and at least ten tokens for each student.
Academic Objective: Students will begin to understand they live in a unique ecosystem.
Vocabulary: native species, introduced species, Tragedy of the Commons
Essential Question: Why are ecosystem services important?
Estimated time for this lesson - about 30 minutes to take the initial survey, then several days to conduct research. Finally one class period for students to share their research on the ecoregional survey and to play the Tragedy of the Commons.

Instructions:
1. Give students a copy of the handout, "Ecosystems Services" From the Ecological Society of America, and ask them to read it through.

2. Briefly discuss what ecosystem services are and ask students to give examples of how local ecosystems provide these services. (e.g., mountain streams clean water, hummingbirds pollinate crops, insects and worms produce soil, forests create topsoil and protect us from the sun.)

3. Take the Ecoregional survey.
As a pretest of the students' knowledge, give a copy of the "Ecoregional Survey" to each student and review any unfamiliar terms, such as native species and introduced species. Then give students about 10 minutes to complete the survey. Afterward, without sharing possible answers at this point, ask the students how they think they did. Collect the completed sheets and retain them. You will give the survey again at the end of the unit to see what students have retained.

4. Divide the class into teams to complete the survey.
Divide your class into teams of 2 or 3 students apiece. Give each team a clean copy of the ecoregional survey. Tell the students that the members of each team should work together over the next few days to complete the survey as accurately as possible. Explain that the students can use whatever resources they can find to answer the questions, including the resources listed on the "Resources" list, additional resources you gathered, the library, the Internet, c[4]ommunity elders or a local naturalist. Stress that they should find the most accurate information they can and encourage them to collect drawings or pictures of the animals and plants they list.

5. Go over the survey results.
Once the students have finished the survey, have them share the information they found and compare their answers to the pretest. Did students find different answers to some of the questions? (For example, how extensive was the group's list of native plants?) What sources proved to be the most helpful? Were they surprised by any of the information they found?

6. Play the Tragedy of the Commons.
Materials: One coffee can and at least ten tokens for each student.
Before students arrive, put three tokens in the can for each student. Seat the students in a circle and tell them you are going to pass around the coffee can and they may take out one, two or three tokens. It is

their choice and they may also choose to show their tokens or hide them. Tell them "whoever gets ten tokens, wins." (It is important that you say this phrase exactly). Also tell them there will be no talking.

Pass the can around and when it comes back to you, count the number of tokens left and add that same amount to the can. For example, if there are 40 tokens left, put forty back in. Then pass the can around again and keep doing so (each time replenishing the number of tokens still in the can) either until someone gets ten, or until you run out of tokens.

The point of the game is that if everyone just took one token on each turn, you would be constantly replenishing the "resource" and it would be sustainable. However, if most or all people take three tokens each time, the resource cannot recover and becomes "extinct". This occurrence is called the Tragedy of the Commons because those resources we all hold in common, such as water, clean air and biodiversity, are not valued as much as those things we can "own" and thus are often polluted or depleted. Have students discuss why they took three. Remind them that you said, "Whoever gets ten, wins." Not, "Whoever gets ten <u>first</u>, wins." [5]Talk about the fact that this game was developed in the 1960's and has been played all around the world since then. When it is played in less developed countries, people often take only one token each time. This is a good opportunity to talk about culture and its effects on the environment. Ask students how this might relate to conserving biodiversity.

<u>Extension:</u> Have students take photographs of some of the plants and animals they have identified then have them create a PowerPoint using the photographs and information from the eco survey. Have them share the PowerPoint with other students.

Ecoregional Survey

How much do you know about where you live?

1. What major habitat type do you live in? (Temperate forest, temperate rain forest, grassland, scrubland, taiga, tundra, desert, etc…)
2. Name three native trees that live in your area.
3. Name five native edible plants that grow in your region and list in which season(s) each is available.
4. Name one poisonous plant that lives in your area.
5. Name ten native animals that live in your region.
6. Name three native animals that you can see in your area at any time of the year.
7. Name three migratory animals that visit or live in your area, and list in which season(s) you're able to see them.
8. How much average rainfall does your community get each year?
9. What is the elevation at your school?
10. Is there any old growth (more than 300 years old) forest within five miles of your school?
11. When (during what season or month) does your community normally get the most precipitation?
12. How long is the growing season in your community?
13. What is the average temperature in July? In December?
14. What are some of the natural signs in your community that show that the seasons are changing?
15. What body of water – lake, pond, stream, or river – is closest to your school?
16. How has your area changed in the past 25 years? (Ask your parents or neighbors)

17. What types of plants and animals lived in your area 10,000 years ago? What was the climate like then?
18. What species in your area – if any – are threatened or endangered?
19. What natural events or processes influence the land around your community? How have they affected the land? (For example, have there ever been glaciers, earthquakes or volcanic eruptions in your area? Do frequent fires, high winds or flooding shape where and how things grow?)
20. What human caused events or processes influence land and biodiversity in your community?
21. Are there any threatened ecological areas in your community? (Are any wetlands, rivers, or forests, for example, in trouble?)
22. Name a nonnative species that has created problems in your community.

Lesson Four - The Value of Biodiversity

Materials**:** The student handout "The value of biodiversity" (one copy for each student); a set of cards, created by the students, with the name and bio of each organism written on it. (The cards must be small enough to pin or tape to students' shirts); a large ball of twine.
Academic objective**:** Students explore the monetary cost of preserving biodiversity and see how all organisms relate to each other.
Vocabulary: biodiversity, species, organism, web of life
Essential Question: What is valuable about biodiversity?
Estimated time for the lesson: Ten minutes to assign organisms, homework time for students to research their organism, one class period for students to do the "Value of Biodiversity" activity.

Instructions:
1. Assign each student an organism that lives in the central Appalachian region. (see the "All Taxa Biodiversity Index" at http://www.dlia.org/smokies-species-tally for a list) Ask each student to research his/her own organism and be ready to tell other students about it. [6] On the day of the activity, have each student make their own "organism" card and attach it to their clothing. (A FRIENDLY REMINDER ABOUT THE NATURE OF TEENS—try to give "unpopular" organisms (fungus, bacteria) to the well-liked students and "popular" organisms such as deer or squirrels to the shrinking violets in your class. You'll see why as the activity progresses.)

2. Distribute the handout. Ask students if they have seen ads on TV or the Internet asking for money to help conserve the rain forest or "save" animals like whales or polar bears. How do they think the money is used? Why do people think such causes are important enough to give money to? Tell them that in this activity, they are going to choose which Appalachian organisms to conserve.

3. Review the directions with the students. Allow ten minutes for students to walk around and "meet" all of the organisms in the room. Tell them it is their job to convince their classmates how important their species is to biodiversity. Students should carry with them their handout and write down notes to help them decide which species they would like to fund.

4. Ask students to return to their seats and finish allocating their $3 million. Stress the importance of including how the money will be spent and why they chose each organism. (Allow about five more minutes.)

5. Survey the students on their top choice organism. Find out how much money was spent on that organism. Listen to some of the ways the money will be spent and the justifications for the spending.

6. Go around the room species by species and find out if there are any organisms that no money was spent on. Explore with the students why such organisms were neglected.

7. Now arrange the students in a circle. Each student will represent his or her animal except three who you will ask to represent the abiotic elements of an ecosystem: the sun, air and water. [7]Give the ball of twine to the "sun" and ask him or her to pass it to an organism that is connected to the sun. That organism then passes the twine to another organism that he or she is connected to (He may eat or be eaten by that organism; He may live in that organism etc.) When all the students are holding onto the twine, choose one to "disconnect". How many other organisms are affected by that disconnection? Ask students to think of how the "web of life" affects them? (This activity is from Project WILD, Web of Life)

8. Possible discussion question: Tell students a new discovery finds that the root of a rare plant that only grows on the north slopes of mountains in the central Appalachians can reduce the effects of the common cold. Discuss whether it is makes sense to stop mountain top removal operations across Appalachia while scientists search for this plant? What if the plant cured cancer? Would that make a difference?

Handout: "The Value of Biodiversity: Life and Death Decisions"

Directions:

You have $3 million to put toward the conservation of species and their habitats. As a point of reference, $9.7 million was spent on the conservation plan for the endangered northern spotted owl. The price of undisturbed rain forest habitat in South America is $35 per acre through the Adopt-an-Acre program sponsored by The Nature Conservancy.

Decide which species (up to ten) will benefit from your investments. List them in order from highest amount to lowest.

Decide how the money will be spent. Will it go to buying up native habitat and turning it into a preserve? Will the remaining individuals be collected from the wild and put in a zoo or botanic garden for captive breeding? Will the money go towards collecting fungal specimens from all around the world to be used in cancer research? Would you start a biodiversity garden project at schools in your community and collect species locally? Do you have other ideas about how the money could be used to preserve biodiversity? Write a justification for each expense. Why would you spend money on that particular [8]species?

Species	Amount of money to be spent on this species	How will the money be be spent?	Why did you spend money on this species?
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

List of organisms by taxa from the Great Smoky Mountains All Taxa Biodiversity Inventory. (note: not all groups of species will be in all parts of Appalachia. This is a [9]sample.)

Lesson Five / Culminating Event: Conducting a BioBlitz

Materials: Field guides, hand lenses, specimen jars or bags, survey sheets (provided) sketch pads, notebooks . Optional: digital cameras, soil probes, thermometers, altimeters, GPS units. (See BioBLitz checklist below)
Academic Objectives: All objectives taught in the unit.
Vocabulary: BioBlitz, specimen, field guides, ground truthing.
Essential Question: What is the biodiversity of the area we will assess?
Estimated Time: Preparation: One hour to contact local scientists, two hours to locate and map the study area. Teaching Time, two class periods to prepare study plans. One half to 1 day for BioBlitz. One class period for summarizing unit.

A BioBlitz is simply an inventory of all life on a particular piece of land in a short period of time (24 hours or less). People have been doing BioBlitzes around the world for about 20 years and the data gathered from those events is extremely helpful to scientists. Many previously unidentified species have been discovered by BioBlitzers including one in New York's Central Park (!) and 910 (to date) in the Great Smoky Mountain National Park. Your students may be interested to look up "BioBlitz" on the web to see what other students have discovered.

Listed below is a description of how to do a BioBlitz. It is followed by a checklist and a list of Do's and Don'ts, and a sample survey form that students may use.

Planning Your BioBlitz on a Local Mountain

This final event is designed to help your students learn and appreciate the rich biodiversity of their local area. It also brings together what they have learned in this unit.

Instructions:

1. Pick a day to conduct your Mountain BioBlitz. [10]Schedule one classroom session before that date for planning with the class and one full field day for the BioBlitz survey. You will need to gather field guides and other resources about ecosystems and organisms your area (check Teacher Tool Kit). You should contact your local college or community college and ask biological scientists to help you and the students on your BioBlitz day. Your state's Department of Natural Resources or Fish and Game Department may also be able to "[11]loan" you a scientist plus they have brochures and other information about trees, other plants, and animals in your state. Your state University Cooperative Extension Office may also have resources and may know of local scientists and naturalists who would like to help with your BioBlitz.

2. Choose a location. You will need to find a nearby natural area where the students can conduct their BioBlitz Survey. Ideally this is a nearby forested mountain (within walking distance of the school) but local parks and even the school yard can work almost as well. Just be sure that the area is safe for your students (no broken glass or other hazards) and that you have the permission of the owners if needed. You or one of the scientists will also need to sketch a quick "site map" for the students. This map should show the boundaries of the study area and a rough delineation of different plant types. For example, areas with shrubs would look different from grassy areas. Be sure to have a copy of the *BioBlitz Survey* form for each student (included). You may also want optional plastic bags and plastic containers with lids to collect specimens, thermometers, magnifying glasses, and field guides. If digital cameras are available, photos of the specimens can be very helpful. Make sure students wear appropriate clothing and bring hats, water, insect repellent and sunscreen. Caution. Do not try to blitz too large an area. Depending on the habitats in the area, one acre should be plenty. Remember, you are going to be looking at everything from trees to tiny microscopic animals. On the other hand, the more differing habitats on your sample area, the more biodiversity students will find.

Optional: Find a local business to sponsor your BioBlitz with lunch, water, etc.

Begin the Activity

In this part of the activity (the actual BioBlitz), your students will have a chance to go outside and take a firsthand look at biodiversity in their own community. Observation is very important in science. This activity is a great opportunity for students to develop their observation skills.

1. Set the stage

Ask your students to imagine that some members of their family wish to cut down trees on land the family has owned for generations. One factor that's important in the family's decision is how biodiversity might be affected by the timbering. The family is planning to meet in just a few weeks to decide whether they should begin cutting trees immediately. They have asked you for a list, or inventory, of all the species found on the site. You have decided to get some of your friends to help you. What kinds of things would you and your friends need to consider as they inventory the biodiversity of this land? List their ideas on the chalkboard.

If the students don't suggest anything, ask them if there might be differences depending on the time of year. Would they expect to find the same species in areas covered by grass as in areas where trees grow? Do they think the relative numbers of individuals, or the population sizes, of each species might be important? Stress that knowing what lives in an area, knowing where different things live within the area, and having an idea of the size of the populations of different living things are all important pieces of information that wildlife managers and conservation biologists try to find out when they investigate the biodiversity of different land areas. Save all the questions the students generated for the wrap-up (step 7). Ask your students how they think scientists find answers to questions like the ones they've generated. (Scientists may use aerial photographs, satellite photos, and special maps; they may interview knowledgeable people and consult historical records; and they usually go to the areas of interest and look at the plants and animals firsthand.)

2. Explain the task

Explain to the students where their study site is located and pass out copies of the "site map" you sketched earlier. Also pass out copies of the *BioBlitz Survey* form. Explain each of the different categories listed on the survey sheet and give some [12]examples of each (students will have researched organisms in the categories for earlier activities). Divide the students into groups of five to seven and explain that the team members have to work together to design a way to fill out their sheets as completely as possible in a relatively short time. This is called a study [13]plan. Where are they going to look? What are they going to look for? How will they record what they find? Are they going to draw sketches of different species, collect specimens, or take very detailed notes? How are they going to divide up the work?

Review the "Do's and Don'ts of Field Work," adding any additional points needed for your particular area. Now give the students time to work in their teams to come up with their study plans.

3. Review the study plans

Once the students have designed their study plans, meet with each group independently and have the group explain its design. Make sure that each group has evenly divided the amount of work to be done among the group members, figured out how they will be getting to all [14]parts of the study site, and has accounted for inventorying the full range of species types listed on its survey sheet. Be sure students have a sampling plan to identify species from their group across the site and not just in one place.

4. Conduct the BioBlitz

Have all students meet at the study area at the appointed time. If *possible, ensure that each group has an adult with them who is knowledgeable about local species.* Although identification to Latin species name is not the main goal of this activity, have field [15]guides available for students to use to help identify what they are seeing.

Students can collect specimens to take back to the classroom. Pass out plastic bags and small containers for use in specimen collection. Some things should not be collected: [16]animals, delicate or rare flowers, dangerous plants (poison ivy and poison oak), and endangered plants. Have the students draw sketches or take close up photos of items that should not be collected or are hard to describe. (Again, refer to the "Do's and Don'ts of Field Work.")

5. Finalize findings
Give the teams time to review and identify what they found, and consolidate information. Have them make notes on the sketch of the area to indicate where certain things were found or where animals or plants were concentrated. You may even have the students prepare a presentation around any specimens they collected to share with the class.

6. Wrap up
Do students think these kinds of assessments are useful? What kinds of organisms have they probably missed? (It's often difficult to find all the species in an area in a short amount of time. Because animals tend to come and go from different areas, they can be missed if the amount of time spent looking for them is too short. Very small or microscopic organisms can be hard to find and identify. Also, there are often seasonal changes in the organisms in an area, so an inventory conducted at one time of year might be very different from an inventory of the same area at a different time of year.)

But despite their problems, a BioBlitz is often very useful because they are a way to quickly get a good idea of the diversity of species in an area. When time is short, a BioBlitz may be the only way to go.)

Assessment
Have each student write a mystery movie review of the "BioBlitz" that the class conducted. The critique should identify which members of the teams played what roles in the blitz, weaknesses in the "plot" or in their study plans, how the blitz was organized (directed), and so on. Encourage the students to use the movie metaphor to look for strengths and weaknesses in the BioBlitz as an assessment of diversity of an area.

Unsatisfactory—the student does not use the movie metaphor, critique the BioBlitz, or complete the activity. The student does not complete any part of the assessment requirements.
Satisfactory—the student uses the movie review to identify both what happened in the BioBlitz and the different roles of individuals in conducting the diversity measurement.
Excellent—the student uses the movie review to identify strengths and weaknesses in the BioBlitz as it was conducted and the use of a BioBlitz in general for measuring diversity.

Writing Idea
Have your students write an article explaining the process they used to collect their data, including any conclusions they may have drawn during the activity.

Extension
If you use a natural area for this activity, you can have students keep track of changes in it from season to season and [17]year-to-year by comparing their data with that collected by other groups in the past. You can also do an urban blitz to identify the plants and animals that live in a city block.

BioBlitz Checklist
1. Contact scientists and other experts and recruit them to help you on the BioBlitz day.
2. Choose a day and time for your BioBlitz (Usually a minimum of four hours is needed.)
3. Find an area on a local mountain (if possible). Contact the owner for permission if necessary.

4. Prepare map of the site (or ask one of the scientists to do so.)
5. Get permission slips for the students if necessary.
6. Make sure students come prepared with insect repellent, sunscreen, water, and appropriate clothing including long pants, sturdy shoes (no sandals!), hats, and work gloves.
7. Gather materials you will need including: loupes, field guides, survey sheets, thermometers, trowels, cameras, sketch pads and specimen bags.

Do's and Don'ts of Field Work

Do's

- Do be sure that you have all the materials you need before you head to the study site.
- Do be a careful observer.
- Do take careful notes about what you find, including information about the locations and characteristics of plants and animals.
- Do handle animals with care—and handle them as little as possible.
- Do return animals you find to the places where you found them.
- Do replace logs and rocks to the position you found them.
- Do stay within the boundaries of your study area.
- Do try to identify unknown species while you're in the field.
- Do wash your hands carefully as soon as you return to the classroom.

Don'ts

- Don't damage trees or other plants by digging them up, ripping off leaves, or tearing at the bark. Be careful when collecting specimens.
- Don't put anything you find—such as berries, leaves, mushrooms, and bark—in your mouth. Also, don't put your fingers in your mouth until after you have returned to the classroom and washed your hands thoroughly.
- Don't chase after, yell at, or throw things at animals you see.
- Don't touch or collect animal droppings, dead animals, mushrooms, or human refuse such as bandages, broken glass, rusty cans, or needles.
- Don't reach under logs or rocks, crevices, or other spaces if you can't see into them.

Student BioBlitz Survey Form

Site_____

City_____

State_____

Temperature_____

Date_____ **Time**_____

Weather_____

Team Members_____

_____

Description *(what the area looks like in general)*

_____
_____
_____
_____
_____
_____
_____
_____

Sketch of Site:

Plants

_____
_____
_____
_____

Insects

Mammals

Birds

Reptiles and Amphibians

Other