

***Lesson Overview***

Participants are introduced to biodiversity. They examine and document local bio facts such as leaves, stones, and feathers, and use their documents and online research to begin a website about local (or broader) biodiversity.

***Teaching Objective***

Participants will learn:

* What biodiversity is and why it’s important to humans
* How to upload a picture or drawing for insertion in a website
* How to use direct observations and online research to create a website

***Materials***

* Paper, pencils, digital camera/camera phone or video recorder
* Examples of local biodiversity found outside (leaves, plants, seeds, insects, etc.)
* One computer per student or small team of students with up-to-date browsers and high-speed Internet access (see *Tips for Classroom Preparation* section);
* Guide sheets and resources

***How to Begin – Background and Prep Tips***

1. **FAMILIARIZE YOURSELF WITH RELEVANT TERMS**

STEM fields are both widely divergent and interconnected, and offer many opportunities for investigation. This lesson focuses on *biodiversity*, so the terms below are relevant to that topic. At the end of the lesson are resources for exploring other STEM fields. Feel free to substitute any of those as the focus for this lesson.

* **Biodiversity** The variety of life on our planet; there may be over 100 million species on Earth, but only 1.7 million have been identified
* **Ecosystem** An interacting network of living and non-living parts of a particular area; ecosystems include plants, animals, bacteria (living parts), weather, soil, nutrients (non-living parts), etc.
* **Species** A group of organisms that can reproduce with each other (e.g., dogs and cats are different species because they cannot interbreed, but beagles and dachshunds are the same species because they can)
* **Ecological Services** Functions of a healthy ecosystem that support life, for example oxygen production, decomposition of wastes, purification of water, nitrogen fixing
* **Endangered** A species is considered endangered if it is at risk of becoming extinct. Habitat destruction, over-hunting, and introduced species are three major reasons species become endangered.
* **Extinction** The end of a species; no individuals of a species exist; for example, dinosaurs became extinct about 65 million years ago

1. **GATHER SEVERAL STEM RELATED WEBSITES FOR STUDENTS TO HACK**

Find some interesting STEM related websites that students may enjoy hacking. Use x-ray goggles to see if they are built with HTML and CSS. If they are not built with either you will not be able to alter them with Hackasaurus and therefore should not use them as examples. Here is a short list of STEM websites built with HTML and CSS:

* Periodic Table: <http://www.ptable.com/>
* Prospect Park Alliance: <http://www.prospectpark.org/environment/wildlife>
* NYC Botanical Garden: <http://www.nybg.org/gardens/thain-family-forest/index.php>
* Hack the Brain: <http://www.princetonbrainandspine.com/subject.php?pn=brain-anatomy-066>
* Great Science For Girls: <http://www.greatscienceforgirls.org/>

1. **HAVE RESOURCES RELATED TO BIODIVERSITY/CONSERVATION AVAILABLE**

There are many organizations with information about biodiversity; a small selection is listed below. Some even offer opportunities to participate in Citizen Science projects. See also several of the resources in the section above. For resources specific to your location, try searches such as "urban biodiversity *my city*"; "suburban biodiversity *my area*"; "rural biodiversity *my area*"

* National Wildlife Federation: <http://www.nwf.org/wildlife/wildlife-conservation/biodiversity.aspx>
* Project Noah: [www.projectnoah.org](http://www.projectnoah.org)
* United Nations Environment Programme: <http://www.unep.org/urban_environment/issues/biodiversity.asp>
* The Nature of Cities: <http://www.thenatureofcities.com/2012/08/14/discovering-urban-biodiversity/>
* Natural History Museum, London: <http://www.nhm.ac.uk/nature-online/biodiversity/>

1. **COLLECT LOCAL BIOFACTS: LEAVES, INSECTS, FEATHERS, SHELLS, ETC.**

These are for the youth to examine and document as evidence of local biodiversity. Alternatively, you can ask each participant to bring in a few biofacts, or take a neighborhood walk to collect/record them. If you choose to take a walk, this will take an entire session. Proceed with the lesson below the next time you meet.

1. **PRACTICE UPLOADING PICTURES TO THE WEB**

In the previous session, you learned how to recognize pictures and how to copy those already uploaded. There are many ways to upload pictures to the web, but below is one simple method.

1. Open a flickr account (<http://www.flickr.com/>)
2. Upload your pictures/drawings to your new flickr account (they must be in .jpg/.png format).
3. Copy image URL (MAC: control+click PC: right mouse click) of each image on flickr and paste it into the hacking window using x-ray goggles.

*Please note*: You should discuss with your supervisor how to provide access to flickr. You may want to open one account that all the youth can use, e.g." PS zzz afterschool," rather than having each person open her own. Also make sure to choose the privacy settings you want. The uploaded pictures can be available publicly or kept private.

1. **FOLLOW TIPS FOR CLASSROOM PREPARATION**

* Provide list of STEM websites:

It is helpful to have a list of websites for students to begin hacking and for research. You may print these on individual guide sheets and/or display them on a wall, chalkboard or smart board. See above for suggested sites, or use others familiar to you.

* Have resources available:

Identify online resources that participants may use while they are building new websites

1. <http://www.w3schools.com/>
2. <https://developer.mozilla.org/en-US/learn>
3. <http://www.tizag.com/>

* Set up instructor’s computer:
  1. Open all necessary webpages/files for the lesson.
  2. Connect instructor computer to a projector or smart board for teacher intro and demonstration (if available). Note: YOU DO NOT have to have a projector/smart board.
* Set up a flickr account for uploading pictures:
  1. Ideally, your youth will be able to scan/download pictures onto the computers as they create them.
  2. If not, create and download in advance pictures of the objects for the youth to upload to flickr. You should have at least one picture for each person/team to upload for practice.
  3. Note: pictures must be in .jpg or .png format. If you scan drawings, make sure to save them in one of those formats.

***Lesson Outline***

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| **Procedure** | **Time** | **Class Configuration** | **Activity** |
| Warm Up | 5 minutes | Entire Class | * Show a local biofact and ask what  it is * List other species/items youth have noticed in their surroundings * Introduce the term "biodiversity" |
| Teach | 15 minutes | Entire Class | * Introduce the local biofacts, and have participants draw or take pictures of them * Lead youth in uploading their pictures to Flickr or another photo sharing resource * Have them replace a picture on a website with the picture they just uploaded |
| Practice | 20  minutes | Individuals, Partners or in Small Groups | * Offer youth additional resources for learning about biodiversity * Have the class start to insert their research, photos and writing into a website using x-ray goggles. You can decide what website they hack. (Websites built entirely with HTML/CSS are the best). |
| Wrap-Up | 5 minutes | Entire Class | * Class reflection. Gather questions and comments. Assign students to continue their biodiversity websites at home and/or at school |
| Extension | If time allows | Partners or in Small Groups | * Have individuals or groups think about other STEM topics they'd like to build websites around |

***Procedure***

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| **Warm Up**  *5 minutes*  Have students seated in groups or at individual stations so they can see you. | 1. Local biodiversity:   Participants will think about what kinds of living and non-living natural things they notice in their environment.   * + Show one artifact (a leaf, a stone, a feather) and ask: *What is this? Where do you think I got it? Is it part of the natural world, or human-made? Living or non-living?*   + Say: *Let's name all the natural things we've seen in our neighborhood.* Have one youth chart the living things, and another the non-living. Note that "living' includes things that were alive at one time; therefore a feather would be classified as living.     1. If you think it would be helpful, have them chart everything in their environment, and have three charts: natural living, natural non-living, and human made   + Say: *The number of living species is called biodiversity. Do you think we have high, medium, or low biodiversity in our area?* |
| **Teach**  *15 minutes*  Youth research and document biodiversity, and practice uploading pictures  Students can remain where they are until it is time to upload, then will move to the computers | 1. Document local biodiversity and introduce webpage and picture uploading:    * Say: *We are going to learn about biodiversity and create a webpage about it, using the X-Ray Goggles and the skills you've practiced previously. We're also going to learn how to upload our own pictures to use on our websites.*    * Say: *Let's start by examining some biofacts from our area.* Display your collection, and ask the class to begin researching and documenting them. Encourage them to start by taking pictures or making drawings, so they can learn how to upload them for use on their websites.    * As people complete their drawings/pictures:      1. have youth scan the drawings and download the photos as they create them      2. OR use previously downloaded pictures of the objects    * Say: *Now we'll learn how to upload those pictures to the web and use them to replace another picture on our website.*    * Ask: *Does anyone remember how we replace pictures on a website?* (Find a picture, right-click and select "copy image url", paste that url over the one in the website, making sure to keep the quote marks in but take out all of the old url)    * Explain that we are going to use a photo website called Flickr. Have them go to the site (http://www.flickr.com/) and either create an account or login to the account(s) already created for their use. Discuss the importance of controlling public access to their pictures, and ask everyone to make sure the account allows only private access.    * Tell them to click on "Upload Photos and Video." They can then either drag and drop or select pictures from a file. Note that if they try to upload something that is not in the right format (.jpg, .png) they will get an error message. Have youth help each other if some are having difficulties.    * When ready, have them move their cursor over a newly uploaded folder, right click, and select "copy image url".    * Tell them to complete the transfer as they have previously: open a webpage, turn on the goggles, and paste the new url over the old. Make sure everyone is able to do this, and engage youth in helping each other. |
| **Practice**  *20 minutes*  Students remain at computers to work independently, in partners or in groups. | 1. Create a website:    * Tell group they are now going to begin putting together their biodiversity websites.    * Ask the class to research and plan, beginning with their bio facts. Provide books and a list of websites for online research, but encourage them to search for additional sites.    * Tell students they need to use a site built with HTML and CSS--the two languages we've learned. Suggest they use one of the following sites:      1. Queens Museum of Art: <http://www.queensmuseum.org/>      2. Brooklyn Arts Council: <http://brooklynartscouncil.org>      3. Prospect Park Zoo: <http://www.prospectparkzoo.com/>  * *Note:* You may need to use more than one session to complete the research and websites. |
| **Wrap-Up**  *5 minutes*  Students reflect on the lesson. Determine how much more time is needed to complete website. | 1. Close out the Website:    * Find out where the students are with building their biodiversity websites. Ask: *Would you like to be able to save this site and return to it?*    * Say: *To save your site, hit the "publish to Internet" button. Open your published site in a new window, then copy the url in the address bar and save it somewhere. This is how you can get back to this page and change it, or share it with friends.*    * Ask if there are any questions or comments. Ask participants to raise their hands if they feel they could improve their sites in the next session. |
| **Extension**  *Time as needed*  Students continue working on their biodiversity websites | * Ask students if they know what STEM means (science, technology, engineering, math). *Is biodiversity a STEM topic*? *What other STEM fields do you know about?* * Give students some STEM websites and ask them to list three STEM topics they'd like to create websites about. Ask them to explain why they are interested in those topics. |

***Resources for this Lesson***

The following links can be shown to class and/or used a lesson guides.

1. Biodiversity for kids lesson plan: <http://www.environment.nsw.gov.au/resources/education/BiodiversityTeachersGuide.pdf>
2. STEM – Works

<http://www.stem-works.com/>

1. PBS STEM for Teachers

<http://www.pbs.org/teachers/stem/>

1. Flickr photo sharing site: for uploading your own pictures/images to the web.

<http://www.flickr.com/>