
Grade 6 Learning Experiences: Biodiversity and its impact on our environment

Experience 4: Consequences of Diminishing Biodiversity

[Long Range Plan: Grade 6 Model 1](#)

Students will develop their knowledge of biodiversity and how to classify biodiversity using a classification system. In addition, they will engage in various scientific processes such as designing and building a bee box, coding an animal classification game, and investigating the impact of the lack of tree cover in cities.

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| <p>Overview of learning experiences</p> | <p>Students will be engaged in active meaning-making and knowledge construction as they develop an understanding of biodiversity. They will learn about the contributions of Black and Indigenous scientists and how the loss of biodiversity often impacts marginalized communities disproportionately.</p> <p>The learning experiences outlined here can be found in: Long Range Plan: Grade 6 Model 1</p> |
| <p>Prior Knowledge / Prior Skill Set(s)</p> | <p>Background Knowledge and Concepts (Teacher)</p> <ul style="list-style-type: none"> - Aware of culturally relevant responsive pedagogy (CRRP) - Understanding of the Learning For All Document French - Understanding of the Supporting English Language Learners document - Understanding of how to engage in the Engineering Design and Research process - Understanding of safety procedures - Understanding of block-based coding concepts and platforms like Scratch <p>Background Knowledge and Skills (Students)</p> <ul style="list-style-type: none"> - Aware of collaboration norms - Aware of various collaboration strategies - Use of technology and suites (e.g. Google Workspace) - Aware of using the internet for research purposes |

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| | <ul style="list-style-type: none"> - Aware of safety procedures - Knowledge of habitats and interactions between species - Prior and knowledge of coding concepts (e.g. loops, conditional statements) - Prior knowledge and experience using basic block-coding and the use of Scratch |
| <p>Strand A - STEM Investigation and Communication Skills</p> | <p>STEM Investigation and Communication Skills:</p> <p> A1.1 use a scientific research process and associated skills to conduct investigations</p> <p> A1.3 use an engineering design process and associated skills to design, build, and test devices, models, structures, and/or systems</p> <p> A1.4 follow established health and safety procedures during science and technology investigations, including wearing appropriate protective equipment and clothing and safely using tools, instruments, and materials</p> <p>  A1.5 communicate their findings, using science and technology vocabulary and formats that are appropriate for specific audiences and purposes</p> <p> A2.1 write and execute code in investigations and when modelling concepts, with a focus on producing different types of output for a variety of purposes</p> <p> A3 Applications, Connections and Contributions: demonstrate an understanding of the practical applications of science and technology, and of contributions to science and technology from people with diverse lived experiences</p> |
| <p>Overview / Big Ideas/Fundamental Concepts</p> | <p>Overview</p> <p>Students will learn about biodiversity through a series of activities that help them see the organization of life on earth. They will use</p> |

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| | <p>observational and communication skills to identify and classify different living things. Using coding skills, they will create an animal classification game and learn about the importance of bees by designing and building their own bee box. Students will also think critically about how the loss of biodiversity can affect people differently based on their identities.</p> <p>Big Ideas Different natural systems need different species in order to reach biodiversity Biodiversity provides benefits to all living things. Not everyone experiences the loss of biodiversity equally.</p> <p>Systems and Interactions: A system is a collection of living and/or non-living things and processes that interact to perform some function.</p> <p>Sustainability and Stewardship: Sustainability is the concept of meeting the needs of the present without compromising the ability of future generations to meet their needs. Stewardship involves understanding that we need to use and care for the natural environment in a responsible way and making the effort to pass it on to future generations no less than what we have access to ourselves.</p> <p>Structure and Function: This concept focuses on the interrelationship between the function or use of a natural or human-made object and the form that the object takes.</p> |
| <p>Learning Goals / Success Criteria</p> | <p>Learning Goal: We are learning about the consequences of diminishing biodiversity.</p> <p>Success Criteria</p> <ul style="list-style-type: none"> ● I can understand and use the scientific research process ● I can examine how the loss of trees affects communities ● I can explain how the loss of biodiversity affects marginalized communities more than non-marginalized communities <p>Ministry of Education Key Points:</p> |

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| | <p>STEM Skills and Connections: Perspectives and approaches that provide opportunities for students to investigate and apply concepts and skills from all areas of learning.</p> <p>Research and Experimentation Processes: Provides students with the scientific literacy skills needed to approach scientific questions that are becoming a part of everyday life.</p> <p>Engineering Design Process: Provides students with support to plan and build solutions to problems or address needs that connect to the curriculum and the world around them.</p> <p>Hands-on, Experiential Learning: Includes hands-on, experiential learning opportunities to support classroom activities that encourage curiosity.</p> <p>Coding: Allows students to explore a wide variety of science and technology concepts and contexts through coding, while also learning valuable skills related to the automation and control of systems.</p> <p>Skilled Trades: Students consider the practical application of skills and concepts within the skilled trades and related occupations.</p> <p>Contributions to Science and Technology: Showcases the important contributions made to science and technology by people with diverse lived experiences.</p> <p>Climate Change: Students will develop the skills and knowledge needed to understand the causes and potential solutions and mitigation strategies related to climate change and other environmental issues, and how they can make the most environmentally responsible decisions possible, given the choices they have.</p> |
| <p>Learning Experiences</p>  <p>A1.1, A.1.5, A3</p> | <p>Consequences of Diminishing Biodiversity</p> <p>Students involve themselves in the scientific research process to learn about the loss of biodiversity and its impact on animals and humans. There are two options for this activity. Before beginning this activity, review the scientific research process on this slide deck with students.</p> |

Teachers are also encouraged to review how to search for information online by reading this '[How to Search On Google](#)' article and how to authenticate ([BreakTheFake.ca](#)) information with their students.

Please choose one of the following options:

Option 1:

This activity will help students understand that biodiversity loss does not affect everyone equally. Some communities are affected more than others. Students will investigate what happens when there are not many trees in a city during a hot spell and who is impacted the most. As students complete the activity, they will uncover that often richest, and whitest communities enjoy the most tree cover, thus cooler temperatures during a heatwave and marginalized communities often have less tree cover and thus higher temperatures.

1. **Prior Knowledge:** Teachers read this [CBC article](#) before beginning.
2. Students will be involved in the scientific research process for this particular activity.
3. Students can use the following questions to begin their scientific research.

Guided Inquiry Questions:

- What happens when few trees are in an urban area?
- Which communities are most impacted in urban areas when there is a lack of tree cover?
- Which communities have the most tree cover in their neighbourhoods?

See [Appendix A: List of Websites for Diminishing Biodiversity Activity](#) for a list of sites that can be provided to students to help them with this activity. Teachers may want to curate their list of sites related to the topic. Alternatively, students can look for their sources of information. Due to the complexity of this task, teacher guidance is recommended.

Opportunities for Differentiation: Provides students with one article. Have both students read a separate article section and then return and share what they have learned. Teachers can encourage students to use Google Read & Write when reading lengthy articles. For ELL students,



A1.5

pre-teach the vocabulary in the article provided.

Provide a graphic organizer to guide students through the scientific research process (see [Appendix B: Diminishing Biodiversity Activity Guide](#)). Students can complete the graphic organizer in pairs. Review the graphic organizer with students and the instructions on the graphic organizer. The activity can be completed on the computer or paper.

To encourage turn-taking and sharing, you can employ the strategy called Rally Coach from Kagan and Kagan Co-Operative Learning (2015). Both students will read and discuss the articles. One student will type/write in the graphic organizer while the other provides the information. The writer may not add their thinking. Students can then switch.

Assessment For Learning Opportunity (A1.1, A1.5, B1.1, and B1.2):

As students work through the scientific research process, listen to and observe them using a checklist (see [Appendix C: Experience 4 Assessment Checklist](#)). Check to see if students can understand and do the different parts of the scientific research process and if they can understand the impacts of the loss of biodiversity.

Option 2

Students investigate a local issue in pairs that could lead to biodiversity loss (e.g. building a new highway, paving over marshland for warehouses, drilling near water reservoirs, etc.).

1. Students will be involved in the scientific investigation process for this particular activity. The teacher may want to review the different parts of the [scientific research process from the Ontario website](#) with students.
2. Review this graphic organizer (see [Appendix D: A Local Issue Related to Biodiversity Activity Guide](#)) with students and ask them to think about a local issue related to biodiversity affecting their community (option to also brainstorm various issues as a class and then have students choose).
3. Once students have chosen, they will use the graphic organizer to engage in the scientific investigation process and explore the issue.

4. Provide a graphic organizer to guide them through the scientific investigation process. Students can complete the graphic organizer in pairs. Review the graphic organizer with students and the instructions on the graphic organizer. The activity can be completed on the computer or paper.
5. To encourage turn-taking and sharing, use the strategy called Rally Coach from Kagan and Kagan Cop-Operative Learning (2015). Both students will read and discuss the articles. One student will type/write in the graphic organizer while the other provides the information. The writer may not add their thinking. Students can then switch.

Assessment For Learning Opportunity (A1.1, A1.5, B1.1, and B1.2):
 As students work through the scientific research process, listen to and observe them using a checklist (see [Appendix C: Experience 4 Assessment Checklist](#)). Check to see if students can understand and do the different parts of the scientific research process and if they can understand the impacts of the loss of biodiversity.

Consolidation

Consequences of Diminishing Biodiversity

Option 1 Consolidation

Once students have completed the activity, they can perform a 'stay and stray' activity (see [Appendix E: Instructional Strategies](#)) with other students.

Call to Action: Using the learning from this activity, students can create a plan of action to make others aware of this issue. They can write a letter to their local MPP, create a poster, or a PSA.

Consolidate the research process with the following guiding questions:

- How does a lack of trees affect communities?
- Which communities are affected by the lack of trees? How do you know?
- Why are specific communities affected by a lack of trees? Why do you think this?
- How do you feel about this issue?

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| | <p>Option 2 Consolidation:</p> <p>Students can create a Google Slideshow presentation on what they learned during the scientific research process. They will then share this with the class using a strategy called to stay and stray (see Appendix E: Instructional Strategies).</p> <p>Call to Action: Using the learning from this activity, students can create a plan of action to make others aware of this issue. They can write a letter to their local MPP, create a poster, or a PSA.</p> <p>Assessment for/as Learning (B1.2, A1.1, and A1.2): Students can create a journal entry about what they learned in their research and use the checklist in Appendix F: Biodiversity Student Self-Assessment Checklist to show where they are at concerning the learning goal.</p> |
| <p>Science and Technology Expectations (Beyond Strand A)</p> | <p>Strand B: Life Systems</p> <p>Overall Expectations</p> <p>B1 assess the importance of biodiversity, and describe ways of protecting biodiversity</p> <p>B1.1 assess the benefits of biodiversity and the consequences of the diminishing of biodiversity</p> <p>B1.2 analyse a local issue related to biodiversity while considering different perspectives; plan a course of action in response to the issue, and act on their plan</p> <p>Overall Expectations</p> <p>B2. demonstrate an understanding of biodiversity, its contributions to the stability of natural systems, and its benefits to humans</p> <p>B2.1 describe the distinguishing characteristics of different groups of organisms, and use these characteristics to further classify these organisms using a classification system</p> <p>B2.2 demonstrate an understanding of biodiversity as the diversity of life on Earth, including the diversity of organisms within species, among species in a community, and among communities and the habitats that support them</p> |

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| | <p>B2.4 describe ways in which biodiversity within and among communities is essential for maintaining the resilience of these communities</p> <p>B2.5 describe interrelationships within species, between species, and between species and their natural environment, and explain how these interrelationships sustain biodiversity</p> |
| Science and Technology Vocabulary | <p>Biodiversity Species Community Habitat Ecosystem Interrelationship Interaction Loops Conditional Statements Engineering Process Research Process Coastal Zone Intertidal Zone</p> |
| Equipment and Materials | <p>Laptops w/ internet access Household items (cardboard, glue, popsicle sticks, rubber bands, straws, scissors) Pool noodles iPad w/ Google Lens Large play area Pylons LCD Projector Scratch</p> |
| Timeline and Preparation | <p>ACTION</p> <p>Option 1 60 mins Option 2 60 mins</p> <p>Consolidation 30 mins</p> |

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| <p>Safety Considerations</p> | <p>Review with students the appropriate use of technology.</p> <p>Review safety procedures for using a glue gun and scissors for the Bee Box activity.</p> <p>Students should be wearing goggles when creating the Bee Box</p> <p>Students should be under adult supervision when hanging and observing their Bee Box</p> <p>Review with students the appropriate behaviour when going for a neighbourhood walk.</p> <p>Review with students appropriate play guidelines when students are playing the Foxes, Rabbits and Leaves</p> <p>Refer to these safety resources:</p> <ul style="list-style-type: none"> ● Safety in Elementary Science and Technology (STAO) ● Safe Activity Foundations in Education Document (SAFEdoc) Science and Technology, Grades 1-8 (OCTE) ● Ontario Curriculum Program Planning – Health and Safety |
| <p>Opportunities For Assessment</p> | <p>Assessment For Learning Opportunity (A1.1, A1.5, B1.1, and B1.2): As students work through the scientific research process, listen to and observe them using a checklist (see Appendix C: Experience 4 Assessment Checklist). Check to see if students can understand and do the different parts of the scientific research process and if they can understand the impacts of the loss of biodiversity.</p> <p>Assessment for/as Learning (B1.2, A1.1, and A1.2): Students can create a journal entry about what they learned in their research and use the checklist in Appendix F: Biodiversity Student Self-Assessment Checklist to show where they are at concerning the learning goal.</p> <p>According to the Ministry of Education, Growing Success Document (2010) assessment is about improving student learning!</p> |

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| | <p>Assessment FOR Learning: Occurs frequently and in an ongoing manner during instruction, while students are still gaining knowledge and practicing skills and is used by teachers to monitor students’ progress towards achieving the overall and specific expectations, so that teachers can provide timely and specific descriptive feedback to students, scaffold next steps, and differentiate instruction and assessment in response to student needs.</p> <p>Assessment AS Learning: Occurs frequently and in an ongoing manner during instruction, with support, modelling, and guidance from the teacher and is used by students to provide feedback to other students (peer assessment), monitor their own progress towards achieving their learning goals (self-assessment), make adjustments in their learning approaches, reflect on their learning, and set individual goals for learning.</p> <p>Assessment OF Learning: Occurs at or near the end of a period of learning, and may be used to inform further instruction and is used by the teacher to summarize learning at a given point in time. This summary is used to make judgements about the quality of student learning on the basis of established criteria, to assign a value to represent that quality, and to support the communication of information about achievement to students themselves, parents, teachers, and others</p> <p>NOTE: The assessment in the learning experiences are intentionally assessment for learning and assessment as learning. The assessment modality is intentionally conversations and observations. This is to help move away from only product based assessment. Throughout the learning experiences students will have many opportunities to demonstrate their understanding through doing, talking and engaging in self-assessment. By collecting assessment for/as learning data teachers can be responsive and provide meaningful feedback. Teachers have been provided with assessment tools to collect evidence of student learning. Assessment opportunities are embedded throughout the learning experiences.</p> |
| Instructional Strategies and Adaptability | <ul style="list-style-type: none"> ● Collaboration and communication are important skills for scientists and that is reflected throughout the learning experiences found in |

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| | <p>this resource</p> <ul style="list-style-type: none"> • Teachers should aim to have a learning environment that is safe, respectful, and inclusive (community building should be ongoing). Please see the ETFO Inclusive Classrooms website. • Students should have an understanding of collaboration norms • There are many collaboration strategies that are employed in the ETFO resource and teachers are encouraged to review them before starting this lesson • Teachers should adapt the lessons based on the needs of the students in their class (Please refer to the Learning for All document) • Movement is important to learning. Students should be given opportunities to get up and move through games and active learning strategies • Teachers should value the lived experiences and stories of their students in the materials they use in the classroom through the use of Culturally Relevant and Responsive Pedagogy (CRRP) |
| <p>Additional Supporting Resources</p> | <p>Ontario Science Centre Curriculum Resources</p> <p>Science North Grade 6 Resources</p> <p>Let's Talk Science Educational Resources</p> |
| <p>Cross-Curricular Opportunities</p> | <p>Language - Students can use various reading strategies to help them understand the articles that are provided in this resource. For example, students can use monitoring comprehension strategies to decode information. (Reading Overall 1)</p> <p>Writing- Students can write a letter using writing traits and conventions urging their local MPP to make a change. (Writing Overall & 2)</p> <p>Math - Students will be applying their knowledge of coding skills to write and execute code. (Coding Overall 1 & 2)</p> |
| <p>Future Opportunities / Next Steps</p> | <p>Students can code this Invasive Species Game from Science North if they finish the classification activity early.</p> <p>Students can explore STEM careers from Let's Talk Science.</p> |

Appendix A: List of Websites for Diminishing Biodiversity Activity

List of Websites for Diminishing Biodiversity Activity

The Importance of Urban Canopy ([English](#) | [French](#))

Conservation Group Introduces Tree Equity Score to Highlight Environmental Racism ([English](#) | [French](#))

[Here's who lives in your city's worst heat island.](#)

Heat Islands ([English](#) | [French](#))

Cooling Canopies ([English](#) | [French](#))

Appendix B: Diminishing Biodiversity Activity Guide

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| Research Question: |
| What happens when few trees are in an urban area? Which communities are most impacted in urban areas when there is a lack of tree cover? Which communities have the most tree cover in their neighbourhoods? |
| Identify and Select Sources (List the websites or resources you used to help you answer the questions above). |
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| Record your information below in point form notes. |
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| Analyze and Interpret (Summarize the information you found in a few sentences. What does the information tell you?) |
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| Communicate the results (One partner will stay with the graphic organizer while the other |

partner will visit other groups to learn. You will then switch.)

Appendix C: Experience 4 Assessment Checklist

Assessment Checklist - Experience 4

Teachers are strongly encouraged to read this page on [Assessment for Learning](#) page and this page on [Assessment and Evaluation](#) before using the checklist below.

Assessment for Learning (Observations & Conversations)

The purpose of this checklist is to collect evidence of student learning over time. The assessment data can be used to provide feedback and be responsive to student needs. This data can also be used for the assessment of learning. During the activities, teachers can observe and converse with students and their ability to meet specific expectations. Teachers can include multiple assessment points for each column since there will be multiple opportunities throughout the activity for the students to show their understanding of each expectation. Teachers can use the assessment coding provided below or your own. A sample is provided.

Learning Experience: Biodiversity

Learning Goal (Overall Ex. A1): We are learning to use the engineering design process to conduct investigations, following appropriate health and safety procedures.

Learning Goal (Overall Ex. B2): We are learning to demonstrate an understanding of biodiversity, its contributions to the stability of natural systems, and its benefits to humans.

Specific Expectations Addressed:

A1.1 use a scientific research process and associated skills to conduct investigations

A1.5 communicate their findings, using science and technology vocabulary and formats that are appropriate for specific audiences and purposes

B1.1 assess the benefits of biodiversity and the consequences of the diminishing of biodiversity

B1.2 analyse a local issue related to biodiversity while considering different perspectives; plan a course of action in response to the issue; and act on their plan

Assessment Coding: N- Not Yet A - Almost G - Got It

| Student Name | A1.1 | B 1.1 | B1.2 | A1.5 | Anecdotal Notes |
|---------------------|-------------|--------------|-------------|-------------|---|
| Matthews, Auston | G, G, A, N | | | | Auston was able to confidently design, build and test his bee house, while following safety procedures. |
| Student Name | B2.2 | B2.1 | B1.4 | A1.5 | Anecdotal Notes |
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Appendix D: A Local Issue Related To Biodiversity Activity Guide

Research Question (Write down a question related to biodiversity based on a local issue you and your classmates brainstormed):

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Identify and Select Sources (List the websites or resources you used to help you answer the questions above).

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Record your information below in point form notes.

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Analyze and Interpret (Summarize the information you found in a few sentences. What does the information tell you?)

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Communicate the results (Create a Google Slide deck summarizing what you found as you researched this local issue).

Appendix E: Instructional Strategies

Instructional Strategies

Think-Walk-Random Pair-Share: Whenever a guiding question is asked all students need at least 20-30 seconds to think of the answer. This wait time helps all students process the response. Then using a visibly random pairing system, pair up the students. Consider randomizing the groups instead of asking students to pick their partners. Research from Peter Lijedenthal, *Building Thinking Classrooms* (2015) shows that randomizing groups/pairs leads to better student cohesion and improved cooperation over time. Instead of having students share with someone at their desk, have them physically get up and move to find their random partner. Movement helps the brain function better. Students should be sharing their ideas while standing up.

Two On A Crayon - Have students buddy up using a random pairing and pass out one crayon and one piece of paper for each pair. Tell everyone they both have to hold the crayon the entire time and color until the song is over and that there is no talking about what to draw. Once everyone is situated, turn on a song and begin coloring. When the song ends, get the students' attention, look at the art and talk about how there are leaders and followers and it's okay to be either. This activity is a chance to talk about fighting for dominance, being too passive, and ideally sharing power. It teaches and helps the students understand that we all need to work together to get the right picture. Sometimes we will be leaders, sometimes we should follow, and that is okay either way. (<https://inside.ewu.edu/managementtoolbox/2-on-a-crayon-2/>)

One Stray One Stay - One of the group members stays (expert) and explains what they have learned during the activity to others. The other pair joins another pair to see what they have learned. Halfway through the activity the students switch roles. The student visiting the expert should be actively listening. Here is another version of this ([English/French](#)).

Gallery Walk - Gives students an opportunity to walk around the classroom and view what others have created.

Rally Coach - With Rally Coach, students fulfill two meaningful roles. Firstly, they are at no point in the learning process able to retreat from a situation. Whether they are the writer, speaker, or coach, that student is considered an essential member of the partner pair or small group. If that student is not writing down a response, he or she is expected to be “coaching” a peer; this coaching might involve searching for textual evidence from a text, revising an error, or simply offering positive encouragement. Palmer (1997) notes that the teacher in a classroom holds a pivotal position in fostering a “safe space and trusting relationship” (p. 20) with students and among students to promote these positive interactions. While this mutual trust may take

time and effort to build, the potential academic yield is tremendous. I have found from personal experience in the classroom that my students not only enjoy Rally Coach, they prefer it to completing worksheets or writing assignments alone. It enables them to socialize with a partner, promoting their social skills, while also seeking help and a second set of eyes for review and support when needed. (Excerpt from <https://ryanarciero.weebly.com/cooperative-teaching-strategies-blog/rally-coach-kagan-strategy>)

Rally Robin- Partner A talks about what they have learned and they write it down. They pass it to Partner B, who checks over their work, provides them a compliment and then adds on to the question.

Stand up-hands up- pair up: Students stand up, put their hand up and quickly find a partner with whom to share or discuss by giving them a high five. This structure is perfect for class building, processing and reviewing information, energizing the class, forming random pairs or teams, and lesson starts or wraps. (Review consent for this activity with students and follow covid protocols)

Appendix F: Biodiversity Student Self-Assessment Checklist

Biodiversity Student Self-Assessment Checklist

N- Not Yet **GT-** Getting There **A-**Almost **G-** Got It!

| Success Criteria | N | GT | A | G |
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| I can describe the benefits of biodiversity. | | | | |
| I can explain the consequences of diminishing biodiversity. | | | | |
| I can demonstrate an understanding of biodiversity. | | | | |
| I can explain diversity within species, among communities and habitats that support them. | | | | |
| I can use the characteristics of living things to create a classification system. | | | | |
| I can use the engineering process to design and build a bee box. | | | | |
| I can use the scientific research process to see how the loss of trees affects communities. | | | | |
| I can write and execute code for a program that classifies animals based on user input. | | | | |