Nelson

SCIENCE

Grade 3
SAMPLE
MATERIAL
INSIDE

About Nelson Science

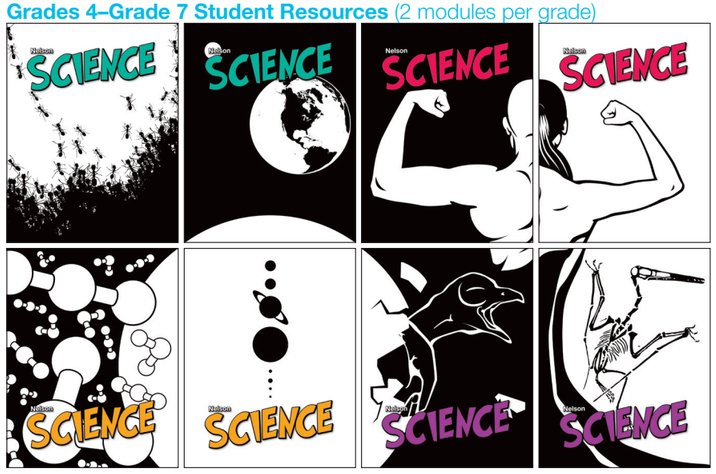
Developed by an experienced team of BC educators, *Nelson Science* is a comprehensive series built from the ground up to fully align with the new BC Science curriculum. Student resources feature activities designed to unleash students' innate curiosity. Infused with First Peoples knowledge and perspectives, and grounded in student-driven scientific inquiry, these resources open inquiry pathways that allow students to deepen their understanding of Big Ideas, develop Core and Curricular Competencies, and build place-based and content knowledge.

Key Features

- Focused on the doing of science—explorations and investigations are designed to develop the skills, processes, and habits of mind of scientific inquiry
- First Peoples scientific knowledge and perspectives are woven into activities through authentic contexts designed to support learning from First Peoples
- Design-focused activities allow students and teachers to cover all *Learning Standards* from the Applied Design, Skills, and Technologies (ADST) curriculum
- A suite of custom-developed, modifiable assessment tools, provide support for formative assessment of core and curricular competencies, as well as content knowledge

Kindergarten–Grade 3 Teacher's Resources

Grades 4–Grade 7 Student Resources (2 modules per grade)



Resource Component Overview

For Students

Kindergarten–Grade 3	Grades 4–7
Activity Cards ■ 9 double-sided, laminated Activity Cards featuring a unique activity on each side (total of 18 activities) to address all 4 strands: Biology, Chemistry, Physics, Earth/Space Science ■ 8 copies of each Activity Card (total of 72 cards) ■ Packaged in a durable cardboard box	**Student Resource** ■ Flexible modular format—2 print modules per grade ■ Each module contains 2 strands: – Biology and Chemistry – Physics and Earth/Space Science ■ Online access to the Science Skills Toolkit **Online Student Centre (sold separately)*** ■ Each Online Student Centre provides: – 1 eBook containing 2 strands (includes audio read-aloud for struggling readers) – Science Skills Toolkit to support curricular competencies

***Contact your Sales Representative for more information.**

For Teachers

Kindergarten–Grade 3	Grades 4–7
Teacher's Resource (includes Online Teaching Centre) ■ Print Teacher's Resource with facilitation strategies and assessment support **Teacher Cards** ■ Double-sided, laminated cards to support place-based activities **Online Teaching Centre** (included with Teacher's Resource) ■ Teacher's Resource eBook ■ Image bank containing art and photos from the Activity Cards in JPG format ■ Science Skills Toolkit with teaching notes to support curricular competencies ■ Modifiable Blackline Masters (includes assessment tools) ■ Interactive Whiteboard lessons for all 4 strands ■ Videos with teaching notes ■ Cross-curricular Connections with teaching notes ■ Weblinks ■ RSS feeds	**Teacher's Resource** (includes Online Teaching Centre) ■ Flexible modular format—2 print Teacher's Resource modules per grade ■ Each module contains 2 strands: – Biology and Chemistry – Physics and Earth/Space Science **Online Teaching Centre** (included with Teacher's Resource) ■ Teacher's Resource eBook containing 2 strands ■ Image bank containing art and photos from the Student Resource in JPG format ■ Science Skills Toolkit with teaching notes to support curricular competencies ■ Modifiable Blackline Masters (includes assessment tools) ■ Animations with teaching notes ■ Videos with teaching notes ■ Literature Connections with teaching notes ■ Weblinks ■ RSS feeds

Teacher's Resource

Inquiring into...

This section provides teachers with a general overview of the unit. This section also notes any scientific descriptions and explanations that have recently been improved as new evidence became available.

Developing the Big Idea and Unifying Concepts identifies and explains the big idea and the unifying concepts that are addressed in the unit.

Multi-Year Classrooms highlights areas of potential combined instruction based on the content and big idea of the unit.

Using an *Opening Provocation* provides a suggested activity that teachers can use to begin the unit to engage students and elicit their natural questions about the conceptual content of the unit.

Observing and Supporting Learning suggests possible teaching strategies for engaging students in this unit.

Inquiring into Ecosystems

You Will Need

- students' packed lunches

Resources Available in the Online Teaching Centre

Family Letter
Documenting Learning: Provocation: Where does my lunch come from?

In this unit, students will use the skills, processes, and habits of mind of scientific inquiry to explore biodiversity in ecosystems. Students will engage in careful observation of local ecosystems, begin to understand how living things in ecosystems interact, and begin to appreciate the diversity and interconnectedness involved in ecosystems. Students will be able to construct their own knowledge of ecosystems and biodiversity through hands-on activities and opportunities to design inquiries based on their own questions. If this is the first unit of the year, consider sending home **Family Letter**.

Developing the Big Idea and Unifying Concepts

The Big Idea for this unit is **living things are diverse, can be grouped, and interact in their ecosystems**. Throughout the unit, students will be examining local ecosystems through a variety of lenses to gain an understanding of how diverse an ecosystem is, and of how the living things in an ecosystem are interconnected and rely on each other to survive and thrive.

The unifying concepts for this unit are **systems** and **interconnectedness**. A system, such as an ecosystem, comprises organized groups of interactive and related parts that form a whole. The concept of systems is subsumed in the concept of interconnectedness in First Peoples perspectives of the natural world. First Peoples view the natural world as a whole—everything is connected to everything else. Students will observe a number of ecosystems both as a whole and as smaller component pieces to help them understand the diversity and interconnectedness of ecosystems.

Cross-Curricular Considerations

This unit on ecosystems also addresses content about the relationship between humans and their environment, in the Social Studies 3 curriculum.

Multi-Year Classrooms

In Grade 2, students explore the life cycles of living things, including those in their local ecosystem. In Grade 3, students can build on the observations they made in the context of studying life cycles in their local ecosystem as they learn about ecosystems and apply that learning to gain a deeper knowledge of their local ecosystem. In Grade 4, students explore how living things sense and respond to their environment and learn that the local ecosystem is part of a larger biome.

Using an Opening Provocation

The activity invites students to **demonstrate curiosity** about how energy flows through an ecosystem by informally considering their own role as consumers. The activity also encourages students in a naturalistic way to **identify questions that can be investigated scientifically** throughout the unit.

Ecosystems

Science Background

Living things must and do interact with each other and the non-living elements of their environment for survival. These interactions often take the form of food chains—living things feeding on one another as a source of energy and building materials.

Animals must obtain food from their surrounding environment. This requires them to feed on other living things or their dead bodies.

Plants make their own food and therefore students might assume that plants do not need other living things to survive. While this can be true over a short period of time, plants do depend on other living things for their long-term survival. Plants need decomposers such as soil fungi to release and supply nutrients from dead organisms as part of nutrient cycles. In most cases, the soil fungi pass nutrients directly to the plant roots. The plants in turn supply the fungi with energy-rich sugar. Many plants are also dependent on animals for pollination and to spread their seeds.

In simple terms, every living thing is potentially food for other living things, and although plants make their own food, they still depend on other living things to recycle the nutrients they need to grow.

Observing and Supporting Learning

- As students work on the Provocation activity, consider documenting evidence of learning using **Documenting Learning: Provocation: Where does my lunch come from?**
- Have students examine their lunches. Ask students if they can identify any living things that the lunch came from (e.g., apples are living things that came from a tree, ham in their sandwiches came from a pig, cheese came from milk, which came from a cow, etc.).
- Ask students what "lunch" would be for any animals they identified from their lunches. Ask students what "lunch" would be for some other local animals.

Assessment Tool

Formative Assessment

Collecting Information	Using Information
Observe the aspects of energy flow in an ecosystem (although they will not think of it in those terms yet) that students demonstrate the most curiosity about.	Consider providing descriptive feedback to the whole class on their curiosity about the natural world: *I could tell you were really curious about what types of living things provide food for you. You wondered about what other living things eat to get energy. You asked an interesting question about how living things are interconnected.*
Listen for questions, or statements that can be turned into questions. Record and use these questions for further student-driven inquiry opportunities throughout the unit.	Provide whole-class feedback on the questions you heard: *Here are some of the questions I heard you asking. Did I miss any?*

Teacher's Resource

Exploration

Curricular and Core Competencies identifies the curricular competencies (scientific skills and processes and habits of mind) that students will be using to build their science knowledge and any core competencies that they will have significant opportunities to develop.

The *Focus Question* identifies a key question that is derived from the learning standards for content knowledge.

Learning from First Peoples links authentic First Peoples perspectives and scientific knowledge about the natural world to the skills and concepts in a given activity.

Flow of energy

You Will Need

Per group:
- clipboard (optional)
- camera (optional)

Resources Available in the Online Teaching Centre

Documenting Learning: Flow of Energy
Three-Column Chart
Place-Based Learning Reflection
Scientific Inquiry Scale K–3
Documenting Communication: Profiles
Documenting Communication: Facets
Documenting Critical Thinking: Profiles
Documenting Critical Thinking: Facets
Self-Assessment: Communication: Facets
Self-Assessment: Communication: Prompts
Self-Assessment: Critical Thinking: Facets
Self-Assessment: Critical Thinking: Prompts
Scientific Inquiry Toolkit (predict, suggest procedures, observe, record, sort and classify, interpret results, evaluate, communicate observations, ideas, and findings, reflect on place)
Weblinks

Using This Exploration

Curricular and Core Competencies: This Activity Card explains how energy flows through producers, consumers, and decomposers in ecosystems. In the place-based Try This! activity, students will have an opportunity to **demonstrate curiosity about the natural world** as they go outdoors to find producers, consumers, and decomposers in a local ecosystem. Before they go outside, students will **consider their ethical responsibilities when deciding how to conduct an experiment**, and **make predictions based on prior knowledge** about what producers, consumers, and decomposers they might see. They will **experience and interpret the local environment** as they **make observations about living things in the local environment** in order to **collect simple data**. They will **sort and classify that data in a provided table**. Students will have an opportunity to **demonstrate an understanding and appreciation of evidence** as they compare their classification systems with those of classmates. Students will **make simple inferences based on their results and prior knowledge** as they consider why they found more producers in the ecosystem than consumers. They will **identify some simple environmental implications of their and others' actions** to evaluate their investigation methods. Students will also **communicate their findings in a variety of ways**, and **express and reflect on their personal or shared experience of place**.

Students will be developing the core competencies of **Communication (facets: connect and engage with others; explain/recount and reflect)** as they compare their classifications, and **Critical Thinking (facet: analyze and critique)** as they sort and classify living things as producers, consumers, or decomposers.

Focus Question: How does energy flow through an ecosystem?

Big Idea and Unifying Concepts: This activity addresses two parts of the Big Idea: **living things can be grouped and interact in their ecosystems**. Students learn that living things can be grouped as producers, consumers, or decomposers, based on how they obtain their energy. This activity supports the unifying concepts of **systems** and **interconnectedness** as students learn how livings things are interconnected in the flow of energy through an ecosystem (the system).

Learning from First Peoples: First Peoples view the flow of energy through an ecosystem as a "circle of life" where all species are interdependent and interconnected. First Peoples have an awareness that what you do (or what you do not do) to one thing in the circle will impact everything else. They also view all that is in the circle of life as equal.

Learning from the Land: Students will again be learning from the land, but this time through the lens of identifying producers, consumers, and decomposers.

1B Ecosystems

Science Background provides a detailed overview of the science concepts covered in a given activity and, where applicable, addresses possible misconceptions.

Science Background

Food represents a source of both building materials and energy for living things. As food is passed on from producers to consumers up the food chain and through complex food webs, the amount of energy available at each step decreases. Each energy transformation in nature results in a loss of useful energy in the form of waste heat. The result is that there must be a continual supply of energy into an ecosystem to support the energy demands of living things. The energy source for most ecosystems on Earth is sunlight.

Plants are the primary producers on land. Plants convert sunlight energy into chemical energy as they synthesize sugar molecules from water and carbon dioxide. They use the sugar molecules both as a food/energy source for their own cells and as raw building materials for making other chemicals needed in their bodies.

Consumers do not make their own food, but instead eat other living things. Consumers that eat plants use the plants' chemicals both as an energy source and as raw building materials. Not all consumers eat plants; many eat other consumers or decomposers.

Decomposers are organisms that break down and feed on the bodies of dead organisms. Most decomposers are either fungi or bacteria. Note that in science, the term *decomposer* is applied to organisms that *absorb* nutrients from dead organisms. This is in contrast to a *scavenger*—an animal such as a maggot that *ingests* whole or parts of dead organisms with mouths.

Possible Misconceptions

Many students will be under the misconception that most consumers are large familiar animals like deer and rabbits. In fact, the great majority of consumers are insects and other very small animals such as spiders, worms, snails, slugs, barnacles, and clams.

Kelp and other types of seaweed are often assumed to be plants. In fact, many are not plants but protists. At the Grade 3 level, you may wish to refer to them as "plant-like" organisms.

Observing and Supporting Learning suggests possible teaching and classroom management strategies for engaging students in this exploration.

Observing and Supporting Learning

- Consider using **Documenting Learning: Flow of Energy** to document your observations of student learning as students respond to the images and text and do the hands-on activity in this Exploration.
- Have students view the text and images on the Activity Card, and discuss the questions.

SAMPLE RESPONSES

Q: How is this huckleberry bush getting energy?
R: The bush gets energy from the Sun.
Q: How is the caterpillar getting energy?
R: The caterpillar is getting energy from the leaf of the plant it is eating.

Literature Connections, opportunities to integrate science concepts and skills while developing literacy skills, are presented in the margin.

Literature Connections

A Log's Life by Wendy Pfeffer and Robin Brickman

Ask students, *What producers, consumers, and decomposers can you identify in this book? How are they interconnected?*

The Wolf-Birds by Willow Dawson

Be sure to read the author's note as well as the story. Ask students, *How does this book show interconnections in an ecosystem?*

Teacher's Resource

Exploration (continued)

Place-based activities provide opportunities to do science outside the classroom and are identified with a tree icon.

To help facilitate place-based outdoor learning experiences, a set of Teacher Cards is included.

Q: How is the wolf getting energy?

R: The wolf is getting energy from the fish it is eating.

Q: How is this mushroom getting energy?

R: The mushroom gets energy from the dead tree.

- Students may notice that the flow of energy seems to stop at decomposers. Explain to students that when energy reaches a decomposer, it can sometimes still be passed on. Ask students, *Have you ever eaten a mushroom? Did you get energy from the mushroom?*
- To help students appreciate the **interconnectedness** of an ecosystem, ask additional questions such as, *What consumers might eat the huckleberry bush? What parts of the huckleberry bush might decomposers use? What other things might a wolf consume?*
- Have students complete the **place-based** Try This! activity.

Unifying Concepts

Teacher Card
Producers, consumers, and decomposers

Try This! provides facilitation strategies for these hands-on activities in the Student Resource, including notes about materials, safety precautions, and sample responses.

TRY THIS! What Producers, Consumers, and Decomposers Can We Find?

Purpose

To have students identify producers, consumers, and decomposers in the local environment.

Notes

- Before students go outside, ask them to review and possibly add to the class list of ethical responsibilities when working in the natural environment.
- In Step 1, students will make a prediction. Ask them to base their predictions on what they have already observed in the previous activity in the same ecosystem.
- When students go outside, have them take a quiet moment to connect with the natural environment.
- In Step 2, students will make observations and record them on a table with the following headings: Producers, Consumers, and Decomposers. Consider distributing **Three-Column Chart** for students to use. If students find scavengers (that is, animals that feed on the bodies of dead organisms, such as slugs, snails, woodlice, millipedes, and earthworms), they will have difficulty classifying them. Suggest to students that they change the heading of the third column to Decomposers and Scavengers, and list them there.
- In Step 3, students should notice that there are many producers and a smaller number of consumers, and that the decomposers can often be hard to find or see. To help students make simple inferences based on their results, ask questions such as, *Why do you think you found so many more producers in the ecosystem than consumers?* (e.g., producers do not move so are easier to find; it can take many producers to feed one consumer)
- After Step 3, ask students to compare their results with their predictions and suggest possible reasons for their findings. If their predictions were incorrect, it is likely because they did not find decomposers. The only decomposers visible to the unaided eye are fungi (and some slime moulds); the remaining decomposers are microscopic (mostly bacterial).
- Ask students to communicate their ideas and findings. Students may choose to present their data by adding this new information about the ecosystem to their field guides.

Sample Responses

1. I predict I will find all three—producers, consumers, and decomposers. I saw producers and consumers before and I think I will be able to find decomposers.
2, 3. Answers will vary. Some groups found different examples. We mostly agreed on what living thing were producers, consumers, and decomposers.
4. I learned new things about my place when I found all kinds of scavengers that I didn't realize were there.

Formative Assessment supports teachers with assessment strategies for observing students, adjusting instruction, and providing descriptive feedback.

Formative Assessment

Collecting Information	Using Information
Observe students as they make predictions, and listen for whether they are basing their predictions on prior knowledge. Ask questions to clarify what prior knowledge they are using to make their predictions; for example, *What have you seen before that helped you make that prediction?*	Provide students with descriptive feedback on their predictions, perhaps using the language of the **Scientific Inquiry Scale K–3**; for example, *You can make predictions based on prior knowledge.*
Observe the extent to which students act on the ethical responsibilities they identified for conducting an investigation in the local ecosystem.	If a student is careless or showing disregard for living things or the environment, intervene and provide direct instruction. The student may be able to identify appropriate behaviour, but if not, consider modelling appropriate behaviour and then asking the student to demonstrate it.
Listen for students who demonstrate curiosity as they experience and interpret their local environment.	Provide descriptive feedback to students, such as, *I can see you are really curious about decomposers and are working hard to try to find them. I think finding something you have never seen before is wonderful! It means your curiosity has given you a new question to investigate.*
Observe for the extent to which students demonstrate an understanding and appreciation of evidence as they compare their classification systems with those of classmates. Ask questions to clarify and extend students' thinking, such as, *How does comparing evidence collected by classmates add to your own evidence? Why is gathering more evidence important?*	If students have difficulty appreciating the significance of additional evidence and comparing classifications, adjust instruction by asking each group to identify 1) at least one living thing that another group found that they did not, and 2) at least one example of a living thing they were not sure how to classify until they discussed it as a class.
Observe the extent to which students can make simple inferences using their results, such as why there are more producers on their lists.	If students are having difficulty making inferences, consider providing direct instruction on inferences, using suggestions under Interpret Results in the **Scientific Inquiry Toolkit**.
Observe the extent to which students can identify simple environmental implications of their actions in this investigation. Ask questions to extend and clarify their thinking; for example, *How did learning about producers, consumers, and decomposers help you understand why it is important to be careful with living things?*	If students have difficulty identifying environmental implications of their actions, adjust instruction by providing sample scenarios and asking students what might happen.
Listen for how students express and reflect on their personal or shared experiences of place.	If students are having difficulty expressing themselves about their experience of the natural environment in the activity, adjust instruction by using some of the questions on **Place-Based Learning Reflection** as oral prompts.
Observe for evidence of critical thinking skills as students analyze their data and classify living things as producers, consumers, or decomposers.	Provide descriptive feedback for students using the language of the **Critical Thinking Competency Profiles**; for example, *You can explore with a purpose in mind and use what you learn. You can find some evidence and make judgments.*
Observe the extent to which students are able to connect and engage with others to process and analyze their data, and explain/recount and reflect on their findings and experience of place.	Provide students with descriptive feedback using the language of the **Communication Competency Profiles**; for example, *You can be part of a group. You can complete activities with your classmates. You can tell something you learned.*

- If you plan to observe with a core competency focus, consider using **Documenting Communication: Profiles** (or **Facets**) or **Documenting Critical Thinking: Profiles** (or **Facets**).

Assessment Tool

Identifying Inquiry Opportunities

Identifying Inquiry Opportunities scaffolds concrete suggestions for additional or alternative scientific inquiries based on students' own questions.

- Some students may express a wish to bring some living things into the classroom. This would allow students to observe energy flow close up and in action.

Teacher's Resource

Conduct an Inquiry!

You Will Need is a list of materials teachers will need for the activity. *Resources Available in the Online Teaching Centre* is a list of resources in the Online Teaching Centre that can be used to support the exploration, such as Blackline Masters, Assessment Tools, and the Science Skills Toolkit.

Big Ideas and Unifying Concepts identifies how the doing and knowing of science can roll up toward the big idea and goals of the science curriculum.

Learning From the Land identifies ways the local natural environment can be used for students to learn important science concepts and skills and processes.

Conduct an Inquiry!
How can we compare two ecosystems?

You Will Need

Per group:
- clipboard (optional)
- digital camera (optional)

Resources Available in the Online Teaching Centre

Documenting Learning: Conduct an Inquiry! How can we compare two ecosystems?
Field Guide Entry
Place-Based Learning Reflection
Scientific Inquiry Scale K–3
Scientific Inquiry Self-Assessment Scale
Documenting Communication: Facets
Documenting Communication: Profiles
Documenting Critical Thinking: Facets
Documenting Critical Thinking: Profiles
Documenting Creative Thinking: Facets
Documenting Creative Thinking: Profiles
Documenting Social Responsibility: Facets
Documenting Social Responsibility: Profiles
Self-Assessment: Communication: Facets
Self-Assessment: Communication: Prompts
Self-Assessment: Critical Thinking: Facets
Self-Assessment: Critical Thinking: Prompts
Self-Assessment: Creative Thinking: Facets
Self-Assessment: Creative Thinking: Prompts
Self-Assessment: Social Responsibility: Facets
Self-Assessment: Social Responsibility: Prompts
Scientific Inquiry Toolkit (observe, predict, suggest procedures, observe, identify patterns, interpret results, evaluate, identify applications, communicate observations, ideas, and findings, reflect on place)
Weblinks

Using This Inquiry

Curricular and Core Competencies: In this inquiry, students will use all the stages of scientific inquiry as they compare the biodiversity of two local ecosystems. Students will have an opportunity to **demonstrate curiosity about the natural world** as they **observe in familiar contexts, make predictions based on prior knowledge**, and **suggest ways to plan and conduct their inquiry**, and **consider ethical responsibilities when deciding how to conduct the investigation**. Students will **experience and interpret the local environment** as they **make observations about living things in the local environment** to **collect simple data** on each ecosystem. They will **use tables or lists to represent their data and show simple patterns** and **compare results with predictions, suggesting possible reasons for findings**. Students will have an opportunity to **demonstrate an understanding and appreciation of evidence** as they identify what evidence they have that one ecosystem is more diverse than the other. They will **reflect on whether the investigation was a fair test**, and **identify some simple environmental implications of their and others' actions** as they consider whether they had an impact on the ecosystem they were investigating. Students will then **transfer and apply** their learning to suggest ways the biodiversity of an ecosystem could be increased. Students will also **express and reflect on personal or shared experiences of place**. They will **represent and communicate ideas and findings in a variety of ways, such as diagrams and simple reports, using digital technologies as appropriate** as they decide with whom, and how, to communicate their results.

Students will be developing the core competencies of **Creative Thinking (all facets)** and **Critical Thinking (facet: question and investigate)** as they conduct the inquiry, and **Communication (facet: explain/recount and reflect)** as they communicate their results to an audience of their choice. Students will also be developing the core competency of **Social Responsibility (facet: contributing to the community and caring for the environment)** as they consider their ethical responsibilities to the environment.

Focus Question: How can we use biodiversity to compare two ecosystems?

Big Idea and Unifying Concepts: By exploring and comparing the biodiversity in two different ecosystems, students will further investigate the first part of the Big Idea: **living things are diverse**.

Learning from the Land: Students will learn from the land as they observe two different local ecosystems and examine the biodiversity of each.

2B Ecosystems

Science Background

The primary factors that influence biodiversity within a terrestrial ecosystem are climate, size, and disturbance. Warm and wet environments, such as rainforests, have very high biodiversity, while dry, cold environments generally have very low biodiversity. Larger ecosystems can support more diversity because food webs tend to be more stable, and organisms that require large home ranges can live there. Disturbances typically reduce biodiversity by altering natural cycles and interactions between species. Some disturbances are naturally occurring events, such as forest fires or extreme weather events, while others are caused by human activity.

Humans may alter ecosystems by introducing new species, polluting the environment, over-harvesting species, replacing entire plant communities, as occurs when forest ecosystems are converted to farmland, or reducing plant communities, as occurs when we build cities. Humans can also take action to benefit and preserve the natural cycles within ecosystems through the protection of the land, air, and water quality, engaging in sustainable harvesting and agricultural practices, and monitoring wildlife populations.

Because plants are the primary producers in all terrestrial ecosystems, their abundance and diversity are good indicators of the health and diversity of the ecosystem. Therefore, when comparing biodiversity in ecosystems, a good place to start is with plants. In general, the greater the number and variety of plants that are present, the greater the number and variety of consumers they will be able to support. Plants are also very easy to observe so they provide fair comparisons between ecosystems. The same is not always true of animals. One ecosystem could have a very large number of insects that are active at night, while another ecosystem might have far fewer insects that happen to be more active during the day when students are making their observations.

Possible Misconceptions

Students might not consider a highly disturbed environment, such as a schoolyard or city block, to be an ecosystem. While such habitats often have very few species, they are not void of life. Lawns and sports fields may be planted with only one or two species of grass, but they quickly become populated with other small plants and are home to a large variety of small animals living in the grass and in the soil. Even apparently empty parking lots are home to insects and spiders, the occasional bird, plants growing in cracks in the pavement, and many microbes.

Observing and Supporting Learning

- Consider using **Documenting Learning: Conduct an Inquiry! How can we compare two ecosystems?** to document your observations of students' scientific inquiry skills and processes as they do this investigation.
- The lesson supports the goals of the **nature of science, conceptual and procedural knowledge**, and **habits of mind** associated with science. Students undertake an inquiry that uses the evidence-based approach of

Assessment Tool

Goals

Custom-developed, modifiable assessment tools support formative assessment of core and curricular competencies, as well as content knowledge.

Nelson SCIENCE

Teacher's Resource

Conduct an Inquiry! (continued)

science, develop skill in conducting a fair test, and consider the ethical and environmental implications of disturbing nature.

Goals

- This inquiry will also help students develop **place-based knowledge** and experiences about the natural world in the area where they live.

Teacher Card
Compare two ecosystems

- Show students the Activity Card and have them compare the pictures of the two ecosystems. Ask students, *How are the ecosystems the same? How are they different?* Ask students to predict which ecosystem they think is more diverse and to explain why they think that.
- Consider taking a photo of each of the ecosystems that you plan to have students investigate. Choose two ecosystems that are very different, with one having lots of biodiversity and the other having very little biodiversity, for example, the schoolyard and a local woodlot, tidal pools, or field.
- For Question and Predict, ensure students understand that the Inquiry question is: Which ecosystem has more biodiversity? Remind students to base their predictions on prior knowledge.
- For Plan and Conduct, ensure that students have discussed a plan to act ethically in nature and that they will act safely as required. If the class has previously developed a list of guidelines, students might review and add to the list. Ask students, *Would you do anything differently in this place-based investigation than you did in your investigation of other ecosystems? Why?*

Social Responsibility

- Have a short discussion with students about the challenges of counting the number of different species, as opposed to individual living things. For example, students might think two plants are different species just because of their size, the number of leaves they have, or if one plant has a flower and the other one does not. If students find ants in four different locations, they may all be the same kind of ant.
- Students should also plan how they will collect their data while outside. For example, they could take photos, write down the names of the living things they find, or collect data using a simple tally chart.

Formative Assessment

Collecting Information	Using Information
Listen for the extent to which students are using prior knowledge to make predictions. Ask questions to clarify and extend students' thinking about how they can use their initial observations of the ecosystems and any prior knowledge they have to make their predictions; for example, *What did you see that made you predict that ecosystem would have less biodiversity? What do you already know about that ecosystem that helped you make your prediction?*	If students have difficulty making predictions, adjust instruction using the Predict section of the **Scientific Inquiry Toolkit**.
Listen for the extent to which students are able to suggest ways to plan and conduct their investigation.	Provide descriptive feedback for students on their planning; for example, *You have decided where you will start. You have planned a way to record your findings while outside.*
Observe for evidence of social responsibility as students develop ethical guidelines for working in the natural environment as they work outside.	Provide students with descriptive feedback using the language of the **Social Responsibility Competency Profiles**; for example, *You can interact with the environment respectfully. You can identify small things you can do that could make a difference.*
Observe the extent to which students are able to make observations that allow them to collect simple data about the number of different types of living things in each ecosystem.	If students seem overwhelmed, consider adjusting instruction by having them stay in a small area and find as many different types of living things as possible before moving to a new area.

- For Analyze, students will be able to compare biodiversity based on the number of different species they have found in each ecosystem. They may also notice that one ecosystem had fewer living things overall, or had many living things but of few different types.
- As students compare their results to their predictions, remind them to try to explain their findings.

Critical Thinking

- For Evaluate, if students identify that some of their actions may have had a negative impact on an ecosystem they investigated, ask them to add to the class list of ethical responsibilities when conducting fieldwork.

Critical Thinking

- Ask students if the investigation was a fair test (or comparison). Did they spend as much time trying to observe living things in each ecosystem at the same time of day and in the same weather conditions? Were there differences in the ecosystems that made it difficult or impossible for students to thoroughly check for species?

Critical Thinking

- For Apply, consider asking students to record their suggestions for ways to increase biodiversity. They may be able to apply some of their ideas in the activity *Design for biodiversity*.

Creative Thinking

- For Communicate, students may want to document their findings in a **Field Guide Entry** or in their science log or science portfolio.

Communication
Blackline Master

Formative Assessment

Collecting Information	Using Information
As students compare their results with their predictions, and give explanations, observe the extent to which they base their answer on their evidence. Ask questions to clarify and extend students' thinking; for example, *Why is it important to find evidence before you decide which ecosystem has more biodiversity?*	Provide students with descriptive feedback on their use of their evidence; for example, *Your prediction was correct, and you used your data to prove it. You realized that it was important to find evidence about biodiversity in the playground because it had more biodiversity than you predicted, even though it had less than the forest ecosystem.*
Observe for the extent to which students can identify some simple environmental implications of their and others' actions while investigating the ecosystems.	If students have difficulty identifying actions that may have had an impact on the ecosystems they investigated, adjust instruction by asking them to focus on specific aspects of the ecosystem. For example, ask them to explain why they do not see many consumers, and how their presence might have affected the consumers (e.g., consumers' avoidance of humans might have prevented them from feeding or nesting).
As students evaluate whether the comparison was a fair test, ask questions to clarify and extend their thinking; for example, *Did you collect data at the same time of day? For the same length of time? In the same way?*	If students have difficulty understanding the concept of a fair test, adjust instruction by using the analogy of a game. Ask students to consider how this comparison could be made into a game that is fair.
Observe the extent to which students are able to express and reflect on personal or shared experiences of place during, or at the end of, the place-based activity.	If some students are having difficulty expressing their reflections on place, consider adjusting instruction by doing a small-group interview using the questions on **Place-Based Learning Reflection**.
Observe the extent to which students think critically throughout the scientific inquiry.	Provide descriptive feedback using the language of the **Critical Thinking Competency Profiles**; for example, *You can make predictions and gather information. You can use evidence to make judgments.*

- If you plan to observe with a core competency focus, consider using **Documenting Creative Thinking: Profiles** (or **Facets**), **Critical Thinking: Profiles** (or **Facets**), **Communication: Profiles** (or **Facets**), or **Social Responsibility: Profiles** (or **Facets**).

Assessment Tool

Colour-coded icons, shown at point-of-use, act as identifiers for coverage of curricular goals, and core and curricular competencies.

Nelson SCIENCE

Activity Card

Exploration

Flow of energy

Energy from the Sun flows to most living things. All living things are connected in the flow of energy.

Producers

Plants are producers.

Producers use energy from the Sun to make their own food (sugar).

Q: How is this huckleberry bush getting energy?

Consumers

Animals are consumers.

Consumers cannot make their own food. Animals consume (eat) producers or other consumers to get energy.

Q: How is the caterpillar getting energy?

Q: How is the wolf getting energy?

Decomposers

Fungi are decomposers.

Decomposers cannot make their own food.

They decompose (break down) dead plants, animals, and animal waste to get energy.

Q: How is this mushroom getting energy?

TRY THIS! What Producers, Consumers, and Decomposers Can We Find?

1. You will go outside to look for producers, consumers, and decomposers. Predict whether you will see all three.
2. Go into your chosen ecosystem and observe the living things. Classify the living things you find as producers, consumers, or decomposers. Use a table.
3. Compare your classification with your classmates' classifications. Do you agree on which living things are producers, consumers, and decomposers?
4. Reflect on your experience looking for producers, consumers, and decomposers. What have you learned about your place?

1B Ecosystems

Explorations present content in an engaging visual format. Each Activity Card is supported in the Teacher's Resource by strategies that support the associated learning standards.

Activity Card

Conduct an Inquiry!

The activities associated with *Conduct an Inquiry!* activity cards are full inquiries. Students set their own specific question and decide how they will plan and conduct their investigation.

Conduct an Inquiry!

How can we compare two ecosystems?

This is an ecosystem.

This is an ecosystem.

One way to compare ecosystems is to compare their diversity.

Question and Predict

Which ecosystem has more biodiversity? Make a prediction.

Plan and Conduct

How will you explore your ecosystems and record your findings?

Analyze

Look for a pattern in your data.

Compare your results with your prediction.

Evaluate

What evidence do you have that one ecosystem has more biodiversity than the other?

Do you think you had an impact on the ecosystems while you were investigating? Explain.

Apply

What could be done to increase the biodiversity of an ecosystem?

Communicate

Decide how to communicate your results.

The *Scientific Inquiry Toolkit*, available in the Online Teaching Centre, supports the development of the procedural knowledge of scientific inquiry.

Conduct an Inquiry! uses the headings for scientific inquiry from the BC curriculum as indicators for the stages of inquiry.

2B Ecosystems

Activity Card

Design and Make!

Design and Make! activities support implementation of the ADST curriculum and allow students to develop their design thinking in relation to science topics. These open-ended design activities invite students to come up with their own design ideas and choose one to act on.

Design and Make!

Design for biodiversity

Ideate

Think about how you could increase biodiversity in your schoolyard.

What local producers could you add to your schoolyard ecosystem? Where could you put them?

Make a list of all your ideas. Choose one to work on.

Make

What materials and tools will you need?

What can you do to ensure that any producers you add can survive?

Act on your ideas. Work safely.

Share

Who can you show what you did?

Tell the story of how you designed and made this project. How have you contributed to your school community and the environment?

What new design ideas do you have?

The *Design Toolkit*, available in the Online Teaching Centre provides additional support for the skills and processes of design.

Design and Make! activities use the headings for the design process from the BC Applied Design, Skills, and Technologies (ADST) curriculum and prompt students through the stages.

3B Ecosystems

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SCIENCE

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