GRADE 6

BIODIVERSITY

TEACHER RESOURCE BOOKLET

TO THE TEACHER

Welcome! This resource guide has been designed to help you enrich your students' learning both in the classroom and at the Toronto Zoo. All activities included in this grade 6 booklet are aligned with the Understanding Life Systems strand of The Ontario Curriculum, Grades 1-8: Science and Technology, 2007. The pre-visit activities have been developed to help students gain a solid foundation about biodiversity before they visit the Zoo. This will allow students to have a better understanding of what they observing during their trip to the Toronto Zoo. The post-visit activities have been designed to help students to reflect on their Zoo experience and to make connections between their experiences and the curriculum. We hope that you will find the activities and information provided in this booklet to be valuable resources, supporting both your classroom teaching and your class' trip to the Toronto Zoo.

CONTENTS

CURRICULUM CONNECTIONS – WHERE DOES IT FIT IN?

Strand: Understanding Life Systems **Topic**: Biodiversity

Overall Expectations:

1. Assess human impacts on biodiversity, and identify ways of preserving biodiversity
2. Investigate the characteristics of living things, and classify diverse organisms according to specific characteristics
3. Demonstrate an understanding of biodiversity, its contributions to the stability of natural systems, and its benefits to humans

Specific Expectations:

Relating Science and Technology to Society and the Environment

1.1. Analyze a local issue related to biodiversity, taking different points of view into consideration, propose action that can be taken to preserve biodiversity, and act on the proposal

1.2. Assess the benefits that human societies derive from biodiversity and the problems that occur when biodiversity is diminished

Developing Investigation and Communication Skills

2.3. Use scientific inquiry/research skills to compare the characteristics of organisms within animal kingdoms

2.4. Use appropriate science and technology vocabulary, including biodiversity, natural community, interrelationships, and stability

2.5. Use a variety of forms to communicate with different audiences and for a variety of purposes.

Understanding Basic Concepts

3.1. Identify and describe the distinguishing characteristics of different groups of animals, and use these characteristics to further classify various animals

3.2. Demonstrate an understanding of biodiversity as the variety of life on earth, including variety within each species of plant and animal, among species of plants and animals in communities, and among communities and the physical landscapes that support them

3.3. Describe ways in which biodiversity within a species is important for maintaining the resilience of those species

3.4. Describe ways in which biodiversity within and among communities is important for maintaining the resilience of these communities

3.5. Describe interrelationships within species, between species, and between species and their environment, and explain how these interrelationships sustain biodiversity

3.6. Identify everyday products that come from a diversity of organisms

3.7. Explain how invasive species reduce biodiversity in local environments

PRE-VISIT ACTIVITIES

1. WHAT IS BIODIVERSITY?

(Adapted from 'Biodiversity For Kids – Stage 2 Science – Teacher's Guide')

The term biodiversity can be a challenging concept for students to grasp, as it is multi-faceted and can be applied within many levels of an ecosystem. The following activity will assess your students' prior knowledge to see what they know about biodiversity and challenge them to create a definition or concept map of this term.

Materials

- Chart paper for each group of 3-4 students
- Markers, scissors, glue
- Access to computers (optional)
- 11" x 17" paper (optional)
- Magazines, newspapers, plant and animal pictures (optional)

Write the word 'biodiversity' on chart paper or on the blackboard for your students. Ask them to read this word and quietly think about what biodiversity could mean. What do we do when we come across a word we don't know? Would breaking the word down help? What might 'bio' mean? What might 'diversity' or 'diverse' mean?

After you have given the students time to reflect upon this new word, divide your class into groups of 3-4 students. Give each group a set of markers and chart paper. Tell your students that they will have several minutes to write everything they know (or think they know) about biodiversity on their paper. You may suggest that they write biodiversity in the middle of their page and create a flow chart to record their thoughts. If you have dictionaries in your classroom, or books about ecology and the environment, the students could use these resources to help them find more information. This activity may also work well if you begin it during a time when your class is in a computer lab; challenge your students to find as much information as they can about biodiversity on the internet.

Once you have given the students time to create their biodiversity charts, invite each group to the front of the class to share their ideas. You may want to give the students a time limit to share their thoughts, or ask them to share the four most important things they wrote down. Guide the students during their presentations by asking questions about biodiversity between species and within species. It is important that the students realize that there is variation in the characteristics within a species, and between species, as well as their environments, and that this diversity is important for the functioning of a healthy ecosystem.

Feeling Bold?

You can extend this activity by having your students create a biodiversity collage. In groups of 2-3 students, the students will be assigned a letter from the word 'BIODIVERISITY.' They will need to write this letter in block or bubble form filling up an 11" x 17" piece of paper. Using magazines, newspapers, and animal pictures, the students will create a collage on top of their cut-out letters; to make your class collages more interesting assign certain themes to each group. For instance, the group working on 'B' may be asked to focus on plants and animals found only within a wetland habitat, while the group working on the 'V' may be asked to focus on plants and animals in a desert habitat, so that during a discussion you can talk about the differences in biodiversity *between* habitats. You may wish to assign the letter 'Y,' for example, to focus on finding pictures of gorillas only, so that you can discuss the biodiversity *within* a species.

Tying It All Together

Language: Oral Communication

1.2. Demonstrate an understanding of appropriate listening behavior by adapting active listening strategies to suit a variety of situations, including working in groups

2.2. Demonstrate an increasingly sophisticated understanding of appropriate speaking behaviour in a variety of situations, including paired sharing, dialogue, and small- and large-group discussions

Language: Writing

1.2. Generate ideas about a potential topic and identify those most appropriate for the purpose

1.4. Sort and classify information for their writing in a variety of ways that allow them to view information from different perspectives and make connections between ideas

The Arts Strand: Visual Arts

D1.3 Use elements of design in art works to communicate ideas, messages, and understandings (e.g., a design of a letter of the alphabet using shapes, symbols, colour, and font style to represent a selected animal and its habitat)

2. BIODIVERSITY TRAY GAME

This activity will introduce students to the many different products that humans use every day which are related to and rely on biodiversity through the popular memory game known as "The Tray Game". Find a selection of every day products used by humans that are made from plant or animal products. Arrange the products on a large tray to display to the class. If possible, create several different trays that you may distribute to groups so students may have the opportunity to closely examine the products. Have a tea towel or cloth to cover the tray when you first set it down in front of students. Remove the cloth and give students a limited amount of time to try and memorize all of the products (use your judgment on the time you allow them, taking into consideration the amount of products you have on the tray).

Variation 1 – Ask students to write down all of the products that they can remember. Ask students to discuss in their groups what similarities or differences they can see between the products. After they've had time to discuss their ideas in their groups, have them share their ideas with the rest of the class. If no one brings it up, explain to students that all of these products contain ingredients or materials that come from several different animals and plants. Use this as an example to break into a discussion on the benefits that humans gain from biodiversity, and the importance in maintaining it.

Variation 2 – Take the tray away and remove one or two products. Replace it and ask the students to write down the objects that are missing.

Variation 3 – Add in a few products that are **not** animal or plant based products and ask students if they can determine which products "do not belong".

Examples of Products Produced from Plants and Animals

Aspirin – *bark and leaves of willow tree* Band-Aids – *cotton plant*

Baseball Glove – *cowhide*
Chocolate Bar – *cocoa beans*
Cotton clothing – *cotton plant*
Crayons – *soybeans*
Footballs – *cowhide*
Glue – *protein from animals*
Gum – *latex sap from sapodilla tree*
Gummy Bears – *animal fat*
Latex Gloves – *latex sap from rubber trees*
Marshmallows – *sugar from plants, gelatin from animals* Paper – *wood from trees*
Pencil Crayons – *wood from trees*
Plastic Bags – *animal fat*
Soap – *animal fat*
Sugar – *sugar cane*
Tennis Ball – *rubber from trees, wool from sheep*
Tires – *animal based stearic acid*
Wool clothing – *wool on sheep*
Baseball – *core of wool and cork or rubber from trees, covering is horse or cowhide*
Baseball Bat – *wood, mostly northern ash trees or maple trees*
Shampoo – *stearic acid from animals or vegetables, citric acid from fruits*
Toothpaste – *glycerin, which is found in animal and vegetable fats*

Tying It All Together
Language Strand: Oral Communication

2.2. Demonstrate an increasingly sophisticated understanding of appropriate speaking behaviour in a variety of situations, including paired sharing and small- and large-group discussions

2.3 Communicate orally in a clear, coherent manner, using appropriate organizing strategies and formats to link and sequence ideas and information

3. JUNK BOX SORTING

(Adapted from a lesson by Prof. Joan McDuff, Queen's University, Kingston Ontario)

Use this activity to introduce the concept of sorting and classification to your students.

Materials
Here are some good junk box ideas: -buttons, shells, bread tags, keys, nuts and bolts, pencils, coins, bottle caps

Using a handful of junk, model to your students how you might go about sorting the material. Ask your students if they notice something about the materials. For example, if you are sorting the buttons and the students say that some of the buttons are red, move the buttons into the appropriate piles as indicated by your students. After the handful of junk is completely sorted, label each sorted group. You can repeat this activity using new descriptions.

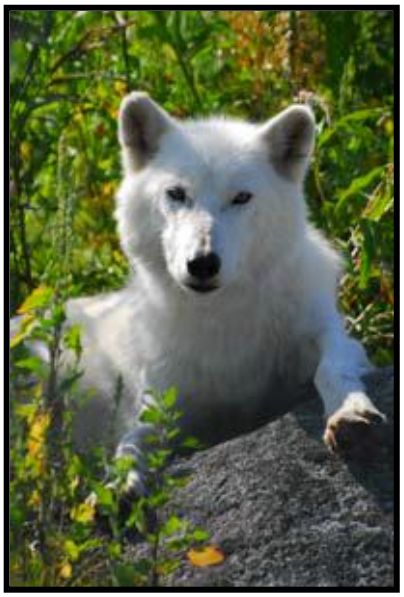
After the introductory activity, place the students into groups of four or five. Place one junk box on each table and say the following: "Have one person take out a handful of junk. Your group is going to sort the objects in 5 or 6 different ways. Try to find some unusual ways to sort. Each time your group has sorted the objects in one way and has agreed on how to describe each category, record the categories on separate pieces of paper (e.g. shiny buttons, dull buttons)." At the end of this activity, each group should have a set of cards with different sorting categories for their junk box. Students can shuffle these cards, draw two cards from the pile, and try to sort junk into these two categories.

You can further extend this activity by having each group leave their material on their desk (after they have finished sorting it) alongside the matching index card they used. When all of the students are ready, groups will turn over their index cards and

walk around the room trying to figure out how other groups have sorted their box. When groups agree on how they think another material was sorted, they may lift the card to peek and check their guess.

Tying It All Together
Mathematics Strand: Patterning and Algebra

- Describe pattern rules (in words)



4. INTERACTIVE ANIMAL SORTING

(Lessons have been accessed through exchange.smarttech.com)

Bringing technology into the classroom is a wonderful way to engage your students and teach new concepts in a fun and exciting format. The following activities have been accessed through the Smart Exchange website; membership to the site is free and provides teachers with access to hundreds of pre-planned lessons. Teachers can use the search engine to select a topic, grade, and subject area to narrow their search.

Materials

- SMART NOTEBOOK program (so that lesson plans will open)
- SMART Board (if you do not have access to a SMART Board, a projector and laptop will also work)
- Tennis ball (for students with fine motor difficulties, holding a tennis ball can help them move text on the board)
- If you have used the KWL chart, then you will know the level of background knowledge that your students possess.

You can access the SMART Board lesson plan titled 'VertebratesUS' here: http://exchange.smarttech.com/details.html?id=e1850a14-0cc0-499b-ba13-847236817dad. This lesson introduces the concept of 'vertebrate' and includes many visuals to help explain which vertebrates are considered mammals, birds, reptiles, fish, and amphibians. The lesson includes YouTube video clips and opportunities for students to come up to the board to answer questions. You can access a YouTube video clip called 'Biodiversity,' created as part of "The Wild Classroom's" podcast: http://www.youtube.com/watch?v=vGxJArebKoc. This clip discusses what biodiversity is and why it is so important for organisms around the world. The clip also discusses how humans depend on biodiversity. While you are watching, look for the language and terms used to describe different types of organisms and see if you can spot any vertebrates!

Tying It All Together
Language Strand: *Oral Communication*

1.1. Listen in order to understand and respond appropriately in a variety of situations for a variety of purposes

5. BIODIVERSITY WORD WALL

Explain to the class that since you are starting a new unit in science, there is going to be new vocabulary and terminology that students will have to learn. Ask the students if they can think of a way to make this new vocabulary visible so everyone can remember to use it when discussing the ideas and concepts in this unit. If nobody suggests posting the words and definitions on the walls of the classroom, explain that you will be creating a Word Wall for biodiversity as a class. Ask the students where they can find definitions of words that they do not know the meaning of, or to confirm definitions that they think they know: dictionaries, encyclopedias, the Internet.

Divide students into 18 groups (one for each of the words on our vocabulary list) and hand out a Four Square word template to each group (this template is attached at the end of the booklet). You may want to enlarge the template and copy them onto 11x17 sheets of paper so they will be large enough for students to read and refer to while seated at their desks. Explain to students that each group will be responsible for completing a Four Square (word, definition, picture, use it in a sentence) for one word. They will then present their completed Four Square to the class who will write down each word, definition and sentence example into their Science notebooks. Make sure to tell students to check with you before completing their final copy of the Four Square to ensure the definition is correct. All of the completed Four Squares will then be post on a Word Wall for students to refer to whenever necessary for the rest of the unit.

Feeling Bold?
Follow this link to access a Smartboard lesson that further explores the topic of 'Invasive Species' in more detail with your students: http://exchange.smarttech.com/details.html?id=71099bf0-3fd5-493c-9790-31c05fc60b80. This Smartboard lesson provides links to YouTube video clips which outline the problems within an ecosystem which have been attributed to the arrival of invasive species, such as zebra mussels and Asian carp.

Tying It All Together
Language Strand: Writing

- **3.2.** Spell unfamiliar words using a variety of strategies that involve understanding word structures, word meanings and generalizations about spelling
- **3.3.** Confirm spellings and word meanings or word choices using a variety of resources appropriate for the purpose

Language Strand: Reading

- **1.2.** Identify a variety of purposes for reading and choose reading materials appropriate for those purposes

Language Strand: Oral Communication

- **2.3.** Communicate orally in a clear, coherent manner, using appropriate organizing strategies and formats to link and sequence ideas and information

6. THE INTERCONNECTIVITY OF OUR HABITATS

(Adapted from 'Biodiversity For Kids – Stage 2 Science – Teacher's Guide')

This activity will explore the interconnectivity of your students' habitats - their homes! By looking at our own habitats and the relationships between them we can see how intertwined the species within a habitat can be.

Materials

- Construction Paper
- Markers
- Pencils
- Cardboard boxes
- Tape
- Scissors
- Glue
- Yarn

Ask your students to close their eyes and think about their house. What does their house look like? How many rooms and windows does it have? What colour is it?

On a half-piece of 8.5" x 11" paper, have each student draw a detailed picture of his or her house. Emphasize that the word 'habitat' means 'home.' Have the students cut their houses out. When each student is done his or her house, have each student attached their house to the blackboard. As a class, try to combine your habitats to create a map of the neighbourhood. Ask the students what is missing from the neighbourhood. Where are the roads, parks, schools, shopping centres, creeks, bus stops, etc? Ask the students to help you create these additional features and add them to the board.

During a class discussion, try to highlight the idea that a town is like an ecosystem:

- People use roads to move between habitats
- Our homes (habitats) provide us with shelter
- People move out of their habitats to find food (e.g. going to grocery stores)
- Some people perform certain jobs within the town to keep it healthy (e.g. firefighters put out fires, waste management workers to remove garbage)

Once your students understand how their town functions, select an ecosystem and examine the roles (niches) that certain plants and animals play within that ecosystem. For instance, you could talk about symbiotic relationships between animals (similar to a police officer helping a lost child in our own town) or you could talk about the reasons why animals leave their habitats in the wild (e.g. for food, exercise).

Feeling Bold?

If you want to make this project more challenging and visually appealing, have the students use small boxes and pieces of cardboard to create a three-dimensional representation of their houses. This would be a great opportunity for students to explore the use of texture as an element of design and use their problem solving skills to find a way to create the textures they see on the exterior of their houses. Once all of the houses are complete, find a space within your classroom or outside to set-up your three-dimensional neighbourhood!

Tying It All Together

The Arts Strand: Visual Arts

- **D1.1** Create two-dimensional, three-dimensional, and multimedia art works that explore feelings, ideas, and issues from a variety of points of view
- **D1.3** Use elements of design in art works to communicate ideas, messages, and understandings
- **D1.4** Use a variety of materials, tools, techniques and technologies to determine solutions to design challenges

FOLLLOW-UP ACTIVITIES

1. BACKYARD BIODIVERSITY

(Adapted from Two Rivers EduKit)

In this activity students will investigate 2-3 different "research plots" in their schoolyard and compare the diversity of organisms. Students should already be aware that biodiversity can be observed on the ecosystem level. Explain/review with students that an ecosystem is any area that you can attach a meaningful label to (a field, hedgerow, lawn, flower garden, pond). Different ecosystems might be large (like a forest), or they might be small (like a single rotten log). Large ecosystems may even contain many smaller ecosystems within them. Students can describe these spaces very simply yet meaningfully by focusing on the dominate feature of each.

Introduction:

Review the difference between biodiversity at the species level and at the ecosystem level. Ask for examples of plants and animals that they might find in the school yard. If you think they may have difficulty coming up with examples of different ecosystems, bring in some pictures of identifiable spaces like a lawn, tree, large puddle, sand pit, etc. They should be able to name these 'mini-ecosystems' with one or two words. Write down the examples you have come up with as a class on the board or chart paper for students to refer to later on.

Investigation:

Divide students into research teams of 2-5 students. Select an area of the school yard that will allow you to establish several "research plots" in different mini-ecosystems (grassy area, a tree, sandy area, etc.). Create at least one plot per group by placing a hula hoop or string circle flat on the ground. If using rope or string, cut lengths of approximately 3 metres and tie ends together to form a loop. Each team should visit 2-3 plots where they will record how many different types of living things (e.g. grass, ants) they can see within each of the circles. Identifying organisms precisely is not essential, but naming them is helpful. Remind students that they are observing only and that care should be taken not to destroy what is found.

Analysis:

Have students decide the best way to represent their data (charts, tables, graphs) so that it can be easily displayed and comparisons can be made between the 2-3 different plots they examined. Questions for students to consider are:

- Which area had greater species diversity?
- How does diversity of spaces affect overall species diversity?
- What may happen if we disturb an area where a species lives?

Feeling Bold?

This activity may be extended by taking a small field trip to a natural area (a forest, field or pond work best, if not, a naturalized section of park or school yard may also be used). The process of investigating 2-3 plots, documenting biodiversity, organizing and presenting it can be repeated. Students may then compare which area has a greater diversity for species: an area altered by humans (the school yard) or a natural area. The results will be indicators of the effect of human impact on previously natural areas.

Tying It All Together

Math Strand: Data Management and Probability

- Collect data by conducting a survey or an experiment to do with their environment or content from another subject, and record observations or measurements
- Collect and organize primary data and display the data in chart, tables, and graphs that have appropriate titles, labels and scales that suit the range and distribution of the data, using a variety of tools
- Select an appropriate type of graph to represent a set of data, graph the data using technology, and justify the choice of graph
- Determine, through investigation, how well a set of data represents a population, on the basis of the method that was used to collect the data

Assessment

When assessing this activity you may consider the following:

- ❑ Students were on task during field work
- ❑ Students were able to recognize different organisms including plants and animals
- ❑ Each student contributed to their group's work
- ❑ Student chose an appropriate graph to represent the data they collected
- ❑ Student's graph was correctly labeled and scaled
- ❑ Student was able to make comparisons between the graphs and data represented
- ❑ Student was able to connect this comparison with the idea that diversity varies from ecosystem to ecosystem

Name: _____

The Diversity Plot

For each plot, write down the name and give a brief description of each organism you observe. If you do not know the name of the organism, write down a description and you can research the name back in the classroom.

Plot 1

Plot 2

Plot 3

Total number of different organisms:

Total number of different ecosystems:

2. THE NEW LIFE CONVENTION

(adapted from a unit within the Ontario Curriculum Planner: http://educ.queensu.ca/~curr/units/GenesisP.pdf)

Have each student take on the role of a famous zoologist that has just discovered a new life form belonging to the animal kingdom and is preparing to present his/her findings at the "New Life Convention". Student presentations can take many formats, such as video, presentation board, oral.

Students must include the following four criteria in their presentation:

1. The animal's physical appearance
2. The animal's structural characteristics
3. The animal's processes of life (growth, reproduction, movement, response/irritability, and adaptation)
4. The animal's Phylum or Class within the animal kingdom.

Tying It All Together

Language Strand: Writing

1.4. Sort and classify information for their writing in a variety of ways that allow them to view information from different perspectives and make connections between ideas

Language Strand: Reading

1.1. Read a wide variety of texts, including informational texts

1.2. Identify a variety of purposes for reading and choose reading materials appropriate for those purposes

Language Strand: *Oral Communication*

1.1. Listen in order to understand and respond appropriately in a variety of situations for a variety of purposes

Assessment

- ❑ Information is organized
- ❑ Information is clearly presented
- ❑ Student included the four criteria in their presentation
- ❑ Presentation is creative

3. ORGANISM MODELS

(adapted from a unit from the Ontario Curriculum Planner: http://educ.queensu.ca/~curr/units/GenesisP.pdf)

Divide your students into ten groups so that each vertebrate class (mammals, fish, reptiles, amphibians, and birds) is represented at least twice. Within each assigned vertebrate class, one group will work on one animal, while the other group will work on a similar animal. For instance, if two groups are assigned to create a model of an animal in the mammal class, one group would research a polar bear, while another group would research a panda bear. When the models are complete, you can discuss the importance of the adaptations between each bear and discuss why it is valuable to have a variety of differences between species.

The model should illustrate the characteristics specific to that group. An index card that clearly identifies the name, class, and characteristics of the organism should accompany the model. Before the groups can begin the model building stage, their plans should be approved by the teacher. Once approved, students are given the materials necessary to build the model and are given time to design and build. Once complete, your students can present their models to the class.

Here are some examples of animals you could assign according to vertebrate class:
Bird - Flamingo, Grey Heron, Owl, Toucan
Fish - Sea Bass, Lionfish, Aba Aba, Clownfish
Amphibian - Blue Dart Frog, Red-Eyed Tree Frog, African Bullfrog
Mammal - Jaguar, Lion, Tiger, Lynx
Reptile - Nile Crocodile, Indian Gavial, American Alligator, Black Caiman

Tying It All Together
The Arts Strand: Visual Arts

- **D1.1** Create two-dimensional, three-dimensional, and multimedia art works that explore
- **D1.2** Demonstrate an understanding and composition, using selected principles of design to create narrative art works or art works on a theme or topic

Language Strand: Oral Communication

- **2.2.** Use an increasingly sophisticated understanding of appropriate speaking behaviour in a variety of situations, including paired sharing and small- and large-group discussions to communicate with different audiences
- **2.4.** Use appropriate words, phrases, and terminology from the full range of their vocabulary to communicate their meaning accurately and engage the interest of their intended audience

Assessment

- ❑ Index card includes accurate information about their model
- ❑ Model is a representative example of their assigned class
- ❑ Group worked cooperatively
- ❑ Group worked together to effectively plan their model
- ❑ Group used appropriate resources for research

4. DRAMATIC PRESENTATIONS

Assign a phylum or class to students in groups of 4 or 5. Students will be given the opportunity to research their topic. They will present their findings through a dramatic presentation that describes the main characteristics of their assigned topic. Examples of presentations could be a skit, rap, dance, etc. Presentations can be followed by a discussion of the performances. Topics can include which forms of presentation were the most effective in communicating ideas clearly, and which were the most engaging and why.

Tying It All Together
The Arts Strand: Drama

- **B1.3** Plan, and shape the direction of the drama or role play by introducing new perspectives and ideas, both in and out of role
- **B1.4** Communicate feelings, thoughts, and ideas to a specific audience, using audio, visual, and/or technological aids to strengthen the impact on the viewer
- **B2.3** Identify and give examples of their strengths, interests, and areas for improvement as drama creators, performers, and audience members

Language Strand: Oral Communication

1.2 Listen in order to understand and respond appropriately in a variety of situations for a variety of purposes

2.2 Use speaking skills and strategies appropriately to communicate with different audiences

Assessment

- ❑ Each student plays an active role in the presentation
- ❑ Students work cooperatively in groups
- ❑ Presentation includes accurate information
- ❑ Information was conveyed clearly
- ❑ Presentation was engaging
- ❑ Student participates in discussion in a positive manner

5. PHOTO ESSAY

Students select an animal from a class of vertebrates. They will create non-fiction stories that illustrate at least four of the defining characteristics of that class (e.g. if a student selects a species of bird, the student should emphasize how and why the bird uses its feathers, its method of reproduction, etc.). The final product should contain a series of photographs or hand drawn illustrations that tell a story about their animal. Student will present their story orally (e.g. to younger students, the whole class, or small groups). Several websites have been listed in the Resource List that students may find useful as sources for pictures and information.

Variations

- Student may research endothermic and exothermic animals as their essay topic
- Students may research the three sub-classes of mammals (placentals, marsupials, and monotremes) as their essay topic

Tying It All Together

Language Strand: Oral Communication

2.4. Use appropriate words and phrases from the full range of their vocabulary including inclusive and non-discriminatory language, and stylistic devices appropriate to the purpose and context, to communicate their meaning accurately and engage the interest of their intended audience

2.6. Identify a variety of non-verbal cues, including facial expression, gestures, and eye contact, and use them in oral communications, appropriately and with sensitivity towards cultural differences, to help convey their meaning

Language Strand: Media Literacy

3.4. Produce a variety of media texts for specific purposes and audiences, using appropriate forms, conventions, and techniques

Assessment

- ❑ Student used research time effectively, and collected appropriate resources
- ❑ Final product includes four characteristics of their class
- ❑ Photos selected are effective, and convey important information about the topic
- ❑ Student uses appropriate vocabulary
- ❑ Student uses a variety of sentence structures in their oral presentation
- ❑ Student uses variations in tone of voice and gestures to enhance their presentation
- ❑ Presentation follows a clear sequence with each illustration building upon the previous one

6. HABITAT LAP SIT

(Adapted from 'Project WILD')

Your students will undoubtedly know that within a habitat, organisms need water, food, shelter, and space in order to survive. When studying biodiversity, it is important for students to realize that we can find many interrelationships and interdependencies between plants and animals within the biological community; these relationships are extremely important for the functioning of the ecosystem. In this activity, students will have the opportunity to physically experience the effects that can occur when one element of an ecosystem is taken away.

Number all of your students from 1-4 when they are standing in a circle. Explain that all of the 'ones' will represent food, 'twos' water, 'threes' shelter, and 'fours' space. Ask the students to stand shoulder to shoulder within the circle and then have every student turn to their right. Ask the students to very carefully sit down on the knees of the person behind them; the circle will be able to support itself. Next, tell the students that their habitat is experiencing a drought year and the water supply has been greatly reduced. At this point you may ask the 'water' students to shake their bodies, lean out of the circle, or lift up one leg, to throw the circle off balance. You may even wish to have the 'water' students to leave the circle altogether; the choice is yours. What happens to the circle? Does the habitat suffer?

You can continue removing and replacing students in the circle based on the scenario presented:

- Pollution of the water supply
- Urban sprawl threatening the space of the habitat
- Soil erosion affecting growth of plants, affecting the food chain
- Introduction of invasive species threatens food and shelter

After your habitat circle has experienced these conditions, ask your student what the activity has meant to them. How does this game represent the interrelationships among the members of a community? How can humans impact the balance things like space, food, water, and shelter within an ecosystem?

Tying It All Together

Health and Physical Education Strand: Movement Competence: Skills, Concepts, and Strategies

B1.1 Perform smooth transfers of weight in relation to others and equipment in a variety of situations involving static and dynamic balance

7. TRACING THE ORIGIN OF A PRODUCT

To introduce the concept of biodiversity to your students, you may have completed the 'Biodiversity Tray Game' from the **'Pre-Visit**' section. It is valuable to discuss how humans benefit from ecosystems with a rich biodiversity. For example, if all plants were exactly the same, the number of products we could create from those plants would also be limited as well.

Each student in your class will select a product and trace its biological origins. An example of products that could be chosen include aspirin, a cotton t-shirt, or even a baseball. Allow time for the students to research their topic on the computer, or check out resources from the school's library.
Your students may want to focus on the following questions in their report:

- Select one biological component of your product. Is that material from a plant or animal?
- Describe the physical characteristics of the plant or animal that the material comes from. Where does this plant or animal fit within the ecosystem?
- What role does it play within the ecosystem?
- What habitat can this plant or animal be found in?
- What regions in the world is this material found in?
- When this material is harvested, how is the rest of the ecosystem affected?
- Are the regions in which this material can be found threatened in anyway? And if so, what can be done to help this region?
- Where does biodiversity fit in? What if we did not have this material at our disposal?

The students can use the above questions as sub-headings to organize their report. As a teacher, you may want to have the students bring in a sample of their product (where appropriate) for their classmates to see. The student could then share some of the important information about the material used to make that product.

Tying It All Together
Language Strand: Writing

1.1. Identify the topic, purpose, and audience for a variety of writing forms
1.3. Gather information to support ideas for writing, using a variety of strategies and a range of print and electronic resources
2.7. Make revisions to improve the content, clarity, and interest of their written work, using a variety of strategies
2.8. Produce revised draft pieces or writing to meet identified criteria based on the expectations

Assessment

- ❑ Information is organized
- ❑ Information is clearly written
- ❑ Student has answered all of the questions
- ❑ Student has cited the information sources

8. WRITING TO MAKE A DIFFERENCE

(Adapted from Two Rivers EduKit)

This activity is designed to show students how easy it is to get involved and make a difference in preserving local, provincial or federal biodiversity. Students will be required to write a letter to a politician about the protection of endangered species. Before beginning this activity it would be a good idea to review how and why laws are important and effective when it comes to the protection of endangered species. Explain to your students that laws can help control the actions of people who might, knowingly or unknowingly, destroy endangered wildlife or habitats. Currently elected politicians are responsible for making and changing laws in Canada, yet how do they know which laws to support and which to change? Inform your students that politicians rely on citizens to tell them which laws are important to them and as a result, letters can become very powerful tools when it comes to changing the way the world works.

Provide your students with time to do some research on what Canada, Ontario, or your local district has done to protect endangered species. Use national newspapers, local papers, magazines like *Nature Canada, McLean's, Owl*, etc The Ontario government *Species at Risk* website, http://www.mnr.gov.on.ca/en/Business/Species/index.html is a fantastic place to start for online research and even includes a map of Ontario where you can click on the region you live in and learn which species are at risk in your local area. The *Canadian Nature Federation* is another website you may wish to check out.

Getting Started:

Explain the aims of a letter writing campaign (influence lawmakers, increase protection for endangered species). Brainstorm the issues and determine which situation might be improved by government action such as improved legislation or enforcement. Identify a significant political issue for the class to address as a whole. Determine which level of government is responsible (federal, provincial or municipal) and find addresses to send your letters to. Introduce/review the proper way to write a formal letter.

Working On It:

Hand out the "Writing to Make a Difference" template (attached at the end of this booklet) that will work as an outline when students are getting started on their letters. Once they have completed the outline they may start on their rough draft, which they will eventually edit, peer-edit and produce a final draft. Finally, they can mail their finished letter to the politician they've selected; you may also wish to have your students send copies to the local paper as "open letters" to the politician.

Reflecting and Connecting:

After the students have mailed their letters have them briefly discuss the following questions as a follow-up to the activity:

- What concerns were you trying to portray?
- What makes an effective letter? (personalized approach, concise simple, clearly stated concern or stand, clear request for actions, respect etc.)
- How can a letter writing campaign help endangered species? (raise awareness, change laws, increase protection)

Assessment

When assessing this activity you may consider the following:

- ❑ Student's researching abilities
- ❑ How informed the student was on the topic they were writing about
- ❑ Whether the student sufficiently completed their outline and preplanning
- ❑ Student's ability to revise, reformat and take in constructive criticism
- ❑ If all elements of a formal letter were included
- ❑ Student's participation and contribution to the follow-up discussion

Tying It All Together

Language Strand: Writing

- **1.1.** Identify the topic, purpose, and audience for a variety of writing forms
- **1.2.** Generate ideas about a potential topic and identify those most appropriate for the purpose
- **1.3.** Gather information to support ideas for writing, using a variety of strategies and a range of print and electronic resources
- **1.5.** Identify their point of view; determine, when appropriate, if their own view is balanced and supported by the evidence; and adjust their thinking and expression if appropriate
- **2.8.** Produce revised draft pieces of writing to meet identified criteria based on the expectations

Name: _____

Writing to Make a Difference

1. Create an outline of your letter:

   a) Who am I writing to (name, position title, address):

   b) Who am I:

   c) What is the issue or problem?:

   d) What is my stand on it?:

   e) What I would like the politician to do about it:

   f) Request that the politician write back to tell you what they will do:

   g) Thank the politician:

2. Write a first draft of your letter in the formal style. Include the date, the name, title and address of the person you are sending it to, the salutation, the body, the complimentary close, your signature and your address.

3. Your rough draft must be edited by yourself and then peer reviewed before writing and mailing your final copy.

9. OH DEER: COMPETITION WITHIN A SPECIES

(Adapted from 'Project Wild')

In an ecosystem, animals within a species must compete for resources such as food, water, and shelter. The availability of resources can determine whether a population will increase or decrease from one year to the next. In this activity, students will become deer competing for resources and will watch as their population changes in each round.

Materials

- Pylons or flags to mark boundaries
- Whistle

Using pylons or flags, mark two parallel lines (in a gym or outside) that are approximately 18 metres apart. Count your students off by fours; send all of the 'ones' to stand along one line that you have marked, and have all the students who are 'twos,' 'threes,' and 'fours' stand along the other marked line. The group of 'ones' become deer who need food, water, shelter, and space in order to survive. The group of 'twos, threes, and fours' become those necessities.

The students must use symbols to represent a necessity in a given round:

- To represent water, they must place their hands over their mouth
- To represent food, they must place their hands over their stomach
- To represent shelter, they must hold their hand together over their head

At the beginning of each round, the students on either line turn their backs towards each other. Each student makes a symbol for one of the three necessities and cannot change that symbol once the round starts. When the instructor says 'go,' everyone turns around to face each other and ONLY the deer (who are also showing their necessity symbol) run across the playing area to find a student whose symbol matches their own. If a deer looking for water finds a student displaying the water symbol on the opposing line, then they touch that student gently on the shoulder and both people head back to become deer on the deer side. The deer found water and successfully reproduced that year, increasing the deer population. If a deer runs to the other side and cannot find another student displaying his/her symbol, then that deer is not successful that year and dies, its body returning to the earth and is now a member of the necessity side.

Tying It All Together

Health and Physical Education: Movement Competence

B1.2 Perform a wide variety of locomotor movements, in combination, at different speeds, in different directions, and using different pathways, while moving around others and/or equipment

B2.1 Demonstrate an understanding of the basic components of physical activities and apply this understanding as they participate in a variety of physical activities

10. PHONE APES: FIGHTING FOR A GOOD CAUSE

(http://www.torontozoo.com/conservation/PhoneApes.asp)

Your students have been learning about biodiversity, as well as the functions of an ecosystem and the interactions that take place within these systems. Now, it is time for your students to apply their knowledge and take action by researching an environmental cause and fighting for change!

While there are many projects and causes to support that would help the environment, you may wish to learn more about an initiative called Phone Apes, developed by the Toronto Zoo.

Since 2006, the Toronto Zoo has been providing 100% landfill free cell phone recycling to schools, community groups, and corporate environments. Recycling old cell phones is extremely important, especially when one takes into account the origin of the materials used to create the circuit boards within them. Coltan is a metallic ore used to produce the element tantalum, which is used to create the capacitors that control electric flow in cell phones, laptops, and pagers. Coltan is mined from the rainforests found within the former Republic of Congo and therefore disrupts and destroys the habitat that is home to the endangered Lowland Gorilla.

Your students could adopt a cause such as this and create school announcements, posters, and notices to ask the school community to donate old electronic devices. There could even be a classroom challenge within the school to see which class can collect the most devices! By emailing phoneapes@torontozoo.ca, you can receive your own Phone Apes collection box and marketing materials. Collection boxes can be dropped off at the Toronto Zoo's Guest Services office or Education/Volunteer Centre.

VOCABULARY

Biodiversity	The variety of life on earth, including variety within each species of plant and animal, among species of plants and animals in communities/habitats/ ecosystems and among communities and the physical landscapes that support them.
Characteristics	Features belonging to an organism which can help us identify it.
Endemic	A plant or animal that is only found within a certain country or area.
Genes	A unit of heredity that is transferred from a parent to offspring and can influence the offspring's characteristics.
Genetics	The variation of inherited characteristics.
Habitat	The natural home or environment of an animal, plant, or other organism.
Invasive Species	A non-native species that negatively affects the habitats they invade. Invasive species may be either plants or animals and may cause disruption by taking over a region and preventing other organisms from performing their jobs.
Interrelationship	The way in which two or more species affect each other because they are related in some way.
Invertebrate	An animal without a backbone. This group includes about 95% of all animal species.
Natural Community	An interactive group of organisms, their habitat, and the natural processes that affect them.
Niche	A role taken on by an organism within its community. Such a role may be occupied by different organisms in different localities.
Organism	An individual living thing including animals, plants, fungi, bacteria, etc.
Species	A group of living organisms that have similar characteristics and can mate with one another to produce offspring.
Ecological Stability	The measure of probability that a population can return to a previous state quickly and avoid extinction. returning quickly to a previous state
Symbiosis	The close relationship between two organisms of different species which live together and interact with each other. At least one of the two living organisms benefits from this relationship. There are three types of symbiotic relationships:
Commensalism	A relationship between two organisms in which one partner benefits while the other does not receive any benefits or harm.
Mutualism	An interaction between two different species of organisms that benefits both organisms. This relationship helps the organisms to survive in harsh conditions where neither organism would be able to survive on its own.
Parasitism	This relationship has a parasite and a host, the parasite benefits by living outside or in the host. The host is harmed or may even be killed by the parasite.
Vertebrate	An animal that has a backbone or spinal column. These include mammals, birds, reptiles, amphibians, and fish.

RESOURCE LIST

***S** = student friendly site ***T** = teacher friendly site

http://www.mnr.gov.on.ca/en/Business/Species/index.html **(S)**
The Ontario government *Species at Risk* website is a fantastic place to start for online research and even includes a map of Ontario where you can click on the region you live in to learn what species are at risk in your local area. There is also an extensive list of all species at risk in Ontario.

http://animaldiversity.ummz.umich.edu/site/index.html **(S)**
A good source for information about the hierarchy of categorizing animals. Use the menu under the title for more resources.

http://www.mysciencesite.com/science6LT1.html
This site offers a breakdown of all the categories in the classification of living things.

http://www.canadianforestry.com/kits/english/index.html **(T)**
The Canadian Forestry Association site offers 8 different Teaching Kits that include detailed lesson plans, practical information on forest issues, and examples of relevant recovery, conservation and stewardship programs. Volumes 2-5 relate directly to the Grade 6 Biodiversity unit, however the other volumes can be revisited for other units/grades.

http://dnr.state.il.us/education/ **(T)**
The Illinois Department of Natural Resources has a website devoted to educating students about the environment. The site includes access to activity plans, CD ROM/DVD resources and unit plans;

http://www.science.ca/ **(S&T)**
Excellent searchable, Canadian website with a wealth of information. Includes current science news and events, the opportunity to interview a Canadian Scientist, an area to post questions on specific topics, an activities resource, and a 'questions of the week' section posted by Canadian students.

http://www.aquatic.uoguelph.ca/animal.htm **(S&T)**
Information divided into six categories: fish, reptiles, mammals, invertebrates, birds, and amphibians. Each section contains an introduction to the category, information sheets (e.g. on adaptations, reproduction), and interactive quizzes.

http://www.schoolnet.ca/vp-pv/mammals/e/ **(S&T)**
A database containing over 238 articles about mammals living in Eastern North America, with pictures, fact sheets, and a teacher's guide.

http://www.perspective.com/nature/animalia/ **(S&T)**
Pictures of the distinguishing characteristics of different animals with fact sheets on vertebrates and invertebrates.

http://exchange.smarttech.com/details.html?id=9dd67aa1-0a97-4fa5-bb5b-43ed6a6d2268 **(T)**
The above hyperlink will take you to an interactive Smartboard lesson which introduces students to the idea that resources within an ecosystem can be limited and therefore animals within a species may need to compete against one another.

Books

Canadian Wildlife Federation. 2010. Project WILD. Council for Environment Education; Canada. **(T)**
An cross-curricular activity guide that provides lesson plan ideas for teachers educating their students about the environment.

Papp, Steven, & Thompson, Geoff. 2003. Biodiversity for Kids –Stage 2 Science Teacher's Guide. National Parks and Wildlife Service. **(T)**

A teacher friendly resource with lesson plan ideas for teaching biodiversity

Strauss, Rochelle (2004). Tree of Life: The Incredible Biodiversity of Life on Earth. Kids Can Press. **(S)**

This useful, attractive, oversize volume uses its height well, employing a tree metaphor to show the earth's biodiversity and how all living things, from bacteria to the largest mammals, are related. Each spread covers one branch of the animal kingdom.

Whyman, Kathryn (1999). The Animal Kingdom : A Guide to Vertebrate Classification and Biodiversity. Raintree. **(S&T)**

This text describes in detail variation and classification within the animal world. The information given includes topics such as animal adaption to environment, food chains, the future of the