CHANGES IN THE ECOSYSTEM

BY TARA SESEPAŠARA-WILLIAMS

How does change (environmental, man-made, etc.) affect the Hawaii ecosystem, living organisms within that ecosystem, and the flow of energy in food chains?

ELEMENTARY FOURTH GRADE

TIMEFRAME UNIT SPANS TWO QUARTERS / THREE - FOUR WEEKS

STANDARD BENCHMARKS AND VALUES

SCIENCE:
- SC.4.3.1: “I can” explain how simple food chains and food webs can be traced back to plants.
- SC.4.3.2: “I can” describe how an organism’s behavior is determined by its environment.
- SC.4.5.2: “I can” describe the roles of various organisms in the same environment.
- SC.4.5.3: “I can” describe how different organisms need specific environmental conditions to survive.

ELA:
- RI.4.1 - I can refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. (4-ESS3-2)
- RI.4.9 - I can integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. (4-ESS3-2)
- W.4.7 - I can conduct short research projects that build knowledge through investigation of different aspects of a topic. (4-ESS3-1)
- W.4.8 - I can recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources. (4-ESS3-1)
- W.4.9 - I can draw evidence from literary or informational texts to support analysis, reflection, and research. (4-ESS3-1)

MATH:
- MP.2 - I can reason abstractly and quantitatively. (4-ESS3-1),(4-ESS3-2)
- MP.4 - I can model with mathematics. (4-ESS3-1),(4-ESS3-2)
- 4.OA.A.1 - I can interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations. (4-ESS3-1),(4-ESS3-2)

NHMO:
1.ʻIke Pilina: Relationship Pathway - We envision generations that have respectful, responsible and strong relationships in service to akua, ʻāina and each other.
2.ʻIke Naʻauao: Intellectual Pathway - We envision generations fostering the cycle of joyous learning through curiosity, inquiry, experience and mentorship.
ENDURING UNDERSTANDING

- The student can describe the various roles of organisms in the same environment.
- The student can diagram and explain how simple food chains and food webs can be traced back to plants.
- The student can explain how an organism's behavior is affected by its environment.
- The student can illustrate and explain how specific environmental conditions support the survival of living organisms.

CRITICAL SKILLS AND CONCEPTS:

Concepts:
1. Food chains and food webs
2. Organism's behavior
3. Roles of organisms
4. Ecosystems
5. Specific needs of organisms

Skills:
1. Explain (each of the concepts)
2. Identify (roles)
3. Diagram (food chain & food web)
4. Compare and Contrast (various roles, ecosystems, changes, etc.)
5. Cite Evidence (Thinking Maps, essays, constructed response, etc.)
6. Create (Thinking maps, posters, animal model, etc.)

AUTHENTIC PERFORMANCE TASK:
The following activities will be completed by students to demonstrate and apply the Enduring Understandings.

- Using interactive lesson on Promethean board, identify various ecosystems, the roles of organisms in the food chain/food web, and adaptations organisms use to survive.
- Diagram a food chain and food web. Identify at least 2-3 roles each organism plays in that environment.
- Read stories: 1) Picture book “Wild” by Emily Hughes (fiction) and (2) Book of Honu: Enjoying and Learning about Hawaii’s Sea Turtles by Peter Bennett & Ursula Keuper-Bennett(non-fiction). Have students compare both stories and make connection to the overall theme of Adaptions.
- Watch the movie: The Magic School Bus Gets Eaten” and complete an exit pass.
- Identify changes in ecosystems and its effect on organisms and/or food chain/foodweb.
- Create a Thinking map that either compares and contrasts two ecosystems or provides a cause and effect of changes to an ecosystem.
- Using interactive game: Build-a-Dino, students will create a new species of dinosaur, give it a name, explain its role, the ecosystem in lived in, and how they came up with its name.
- Create your own species that could live in one of Hawai’i’s diverse ecosystems.
- Pre/post assessment on above stated concepts.

AUTHENTIC AUDIENCE:
The lessons and activities are specifically designed for fourth grade students.

OTHER EVIDENCE:
- Thinking Maps
- Exit Passes
- Promethean flip chart activities
- Lab notes/charts
- Journals
- Promethean quiz results
- Other mini projects assignments
LEARNING PLAN

1. Students will complete a pre-assessment by answering the following questions:
   a. What roles do organisms play in their environment?
   b. What are some natural resources found in various ecosystems that we use today?
   c. How does the use of these natural resources affect the ecosystem and the organisms within the ecosystems?
   d. Will the role of organisms change due to the use of natural resources? Explain.

2. Hook: “Birds of a Feather lab”
   a. Students will be presented with 5 items (tongs, tweezers, chop sticks, strainer, and eye dropper).
   b. Students will be expected to choose 2 of those items, write their choices on a post it, and hand it to the teacher.
   c. Students are then informed the tools they chose were their beaks. They are birds with special beaks that allow them to capture/get food. As part of the activity, they will try to collect as much food as they can within 30 seconds.
   d. Each student drew a chart (observational purposes) to record their data.
   e. At the front of the room are 6 covered plates that are filled with food items. Each item represents a food that birds typically eat buried in “soil” or water. (See chart for food list)
   f. In groups of 6, students were to stand in front of a covered plate and handed their first “beak”. They were then reminded that when the lid is removed they will have 30 seconds to collect as much food as possible. The lids are then removed and the timer started.
   g. When the timer signals the end, students are to then count the amount of food collected and record their results on their chart.
   h. When done, they are asked to move in a counter clockwise direction to the next container and repeat steps f and g using their second chosen “beak”.
   i. When all students have completed the lab, they were to sit with their groups to share their results and record the results of the group members onto their chart.
   j. Students were called back to their seats for whole group discussion where groups were able to share their results with the class. After allowing a few representatives from various groups to share, a larger discussion started based on student results. Discussion centered around the following questions”
      i. What challenges did you face when attempting to collect your food item?
      ii. Were you able to collect any food when faced with these challenges?
      iii. How were you able to collect food? What did you have to do to ensure you could collect food?

**Discussion leads into the topic of animals changing their behaviors to meet their needs. In other words adapting to survive when changes to their environment occur.**
3. Next would be to conduct several mini-lectures, activities, and labs to provide informational background before assigning the “project”:
   a. Parts of Ecosystems
   b. Matter and Energy in Ecosystems
   c. Adaptation and Extinction
   d. Earth’s Changing Surface
   e. Using Resources Wisely

4. Performance Task: “Discovery of a New Species!”
   a. Students will apply knowledge learned from lectures, activities, and labs to complete the following tasks:
      i. Choose and research an ecosystem found in Hawaii. (i.e. rainforest, ocean, stream, coral reef, tide pool, fish pond, etc.)
      ii. Build a model of a “new” species (animal or plant).
      iii. Create a poster that provides the public information on the chosen ecosystem (location, climate, etc.), the newly discovered species, and animal adaptations animal needs to survive.
      iv. Information for species should include: organism’s physical features, niche, habitat, diet, and adaptations that allow it to survive in its ecosystem even with the changes in its ecosystem due to the threat.
      v. Prepare a 3-5 minute presentation to share your newly discovered species at the “press conference”.
      vi. Students will present their poster and “new” species to their class and other “guests” (principal, teachers, parents, etc.)

5. A Post-assessment will be given to students. Questions similar to the pre-assessment but will also include a couple of benchmark questions.

CONCLUSION
The Hawaiian Islands is one of the most diverse bio-regions in the world since it contains around 150 ecosystems, some of which have remained the same for millions of years, while others are under threat. The lessons and project is designed to bring awareness to students and the public of Hawaii’s unique and fragile ecosystems and organisms as well as bringing to light various factors that pose a threat to Hawaii’s ecosystems or organisms. With this knowledge, it is our hope that students make lifestyle changes to assist in taking care of the land (Samoan: “Tausi ma puipui le fanua aua le lumana’i” – Preserve and protect the land for the future. Hawaiian: “Mālama I ka ‘āina” – Caring for the land).

REFERENCES
Letts, Michael J. & Richmond, Kia Jane. “Imagining Insects: Integrating the Fine Arts into Writing, Literature, and Science”. Language Arts Journal of Michigan Volume #28, Article 9
Bio kids-Kids Inquiry of Diverse Species. www.21stcenturyschools.com
Waimea Valley Guided School Programs
Bennett, Peter & Keuper-Bennett, Ursula. “Book of Honu: Enjoying and Learning about Hawai’i’s Sea Turtle”. University of Hawaii Press. 2008
FEATURE CREATURE

ANIMAL NAME: 

WEIGHT: ___________ LENGTH: ___________

DESCRIBE THE ANIMAL AND ITS HABITAT:

THIS OR THAT?
☐ HERBIVORE ☐ SCAVENGER
☐ OMNIVORE ☐ DECOMPOSER
☐ CARNIVORE ☐ PRODUCER

DESCRIBE TWO PHYSICAL ADAPTATIONS FOR SURVIVAL:

DESCRIBE TWO BEHAVIORAL ADAPTATIONS FOR SURVIVAL:

DESCRIBE THE PROBLEM THAT IS THREATENING THIS ECOSYSTEM:

FOOD CHAIN:

NAME ____________________________ NUMBER _____ DATE ____________
NEW SPECIES PROJECT CHECKLIST

☐ I have chosen an ecosystem. It is ____________________________

☐ I have completed the research of my ecosystem and have enough information to write my paragraph.

☐ I have sketched a draft of what my animal will look like and have come up with a name for my animal.

☐ I have completed the model of my animal and included the card with the required information.

☐ Poster: I have the animal’s name completed.

☐ Poster: I have the animal’s weight and length completed.

☐ Poster: I have the animal’s role completed.

☐ Poster: I have completed the paragraph that describes the animal and its habitat.

☐ Poster: I have completed the 2 Adaptations paragraphs.

☐ Poster: I have completed the paragraph describing the problem that threatens the ecosystem.

☐ Poster: I have the food chain chart completed.

☐ I have turned in my completed project on time.

☐ Oral Presentation: I am ready to present. I have cards with everything I will share about my animal to help me with my presentation. I have practice ______ times with ____________________________
## ANIMAL MODEL AND REPORT PROJECT RUBRIC

<table>
<thead>
<tr>
<th>Criteria:</th>
<th>4 - ME</th>
<th>3 - MP</th>
<th>2 - DP</th>
<th>1 - WB</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
<td>Model is realistic based on habitat information provided in poster.</td>
<td>Model is relatively realistic, with most of information provided in poster.</td>
<td>Model is somewhat realistic; however, some features do not match information on poster.</td>
<td>Model is not realistic or does not match the information provided in poster.</td>
</tr>
<tr>
<td><strong>Animal &amp; Environment Paragraph</strong></td>
<td>The paragraph states the animal’s name and describes the animal’s environment.</td>
<td>The paragraph is missing a little information about the animal’s environment.</td>
<td>The paragraph is missing a lot of information about the animal’s environment.</td>
<td>The paragraph has no information on the animal’s environment.</td>
</tr>
<tr>
<td><strong>Structural Adaptation Paragraph</strong></td>
<td>Explains 2 structural adaptations and how they help the animal survive.</td>
<td>Explains just 1 structural adaptation and an explanation on how it helps the animal survive.</td>
<td>Explains just 1 structural adaptation or an explanation on how it helps the animal survive.</td>
<td>Does not mention any structural adaptations.</td>
</tr>
<tr>
<td><strong>Behavioral Adaptations paragraph</strong></td>
<td>Explains 2 behavioral adaptations and how they help the animal survive.</td>
<td>Explains just 1 behavioral adaptation and explains how they help the animal survive.</td>
<td>Explains just 1 behavioral adaptation or how they help the animal survive.</td>
<td>Does not mention any behavioral adaptations.</td>
</tr>
<tr>
<td><strong>Threats to the Ecosystem paragraph</strong></td>
<td>Describes a major problem the ecosystem is facing, why it’s a problem, what’s being done to fix the problem, and how their animal will survive in the midst of this problem.</td>
<td>Describes 3 of the 4 requirements for this paragraph.</td>
<td>Describes 2 of the 4 requirements for this paragraph.</td>
<td>Describes 1 of the 4 requirements for this paragraph. Or does not mention any threats to the ecosystem.</td>
</tr>
<tr>
<td><strong>Accuracy of information</strong></td>
<td>Information of habitat was correct.</td>
<td>Only a few mistakes in the information.</td>
<td>Many mistakes in the information.</td>
<td>Too many mistakes in the information or no information provided.</td>
</tr>
<tr>
<td><strong>Conventions of Writing</strong></td>
<td>Writer makes no errors in capitalization, punctuation, grammar, or spelling so the paper is exceptionally easy to read.</td>
<td>Writer makes 1 or 2 errors in capitalization, grammar, spelling, or punctuation, but the paper is still easy to read.</td>
<td>Writer makes a few errors in capitalization, grammar, spelling, and/or punctuation that catch the reader’s attention and interrupt the flow.</td>
<td>Writer makes several errors in capitalization, grammar, spelling, and/or punctuation that catch the reader’s attention and greatly interrupt the flow.</td>
</tr>
<tr>
<td><strong>Completeness</strong></td>
<td>Project has all of the required elements.</td>
<td>Project has almost all of the required elements.</td>
<td>Project is missing several elements.</td>
<td>Project has too many missing elements.</td>
</tr>
<tr>
<td><strong>Attractiveness/Craftsmanship</strong></td>
<td>Both the poster and the model are exceptionally attractive in terms of design and neatness.</td>
<td>The poster and the model are attractive in terms of design and neatness.</td>
<td>The poster and the model are acceptably attractive though it may be a bit messy.</td>
<td>The poster and the model are distractingly messy or very poorly designed. It is not attractive.</td>
</tr>
</tbody>
</table>

### SCORE _______  GRADE _______

<table>
<thead>
<tr>
<th>Category</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Model/Poster</td>
<td></td>
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<tr>
<td>Writing</td>
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</tbody>
</table>
EXTRA! EXTRA! READ ALL ABOUT IT!!!
FOURTH GRADE SCIENTISTS DISCOVER NEW SPECIES!!!

You have just discovered a new species and need to share this information with the public at a televised press conference. Be sure to include the following information in your report to the media. Be prepared to answer questions.

ANIMAL MODEL

Use clay, play dough, or any other household items to build a model of your animal that:
1. Shows what your animal looks like
2. Placed on a platform or flat surface
3. Includes a title card that displays your animal’s name, its habitat, its niche, and what it eats.

CREATE YOUR OWN SPECIES

Project Directions
1. Choose one of the following Hawaii Ecosystems:
   a. Coral reef
   b. Rainforest
   c. Alpine Desert Zone
   d. Tide Pools
   e. Coastal Zone
   f. Wetlands

ANIMAL PARAGRAPH

Paragraph should include the following:
1. Title: Animal name
2. Four Key descriptive components
   a. Appearance: what your animal looks like, including size, body covering (i.e. fur, scales, etc.) details about ears, eyes, feet, tail, etc.
   b. Food: What does it eat? Where on the food chain is your animal.
   c. Niche: Describe the role this animal plays in its environment.
   d. Habitat: What ecosystem can your animal be found? Describe the climate, the vegetation, and other animals that live in the same habitat.

ADAPTIONS PARAGRAPH

BEHAVIORAL ADAPTATIONS PARAGRAPH:
Describe 2 behaviors that your animal does that allow it to survive in its environment. Be sure to use descriptive vocabulary words in your paragraph. For example: When a camel feels threatened, a behavior adaptation is to spit. This discourages the predator from getting too close.

PHYSICAL ADAPTATIONS PARAGRAPH:
Describe 2 different physical features that your animal has that allow it to survive in its environment. Be sure to be as descriptive as possible. For example, a camel has a large hump on its back and wide feet. The camel’s wide feet allow it to walk on the sand. The hump contains fat that breaks down to supply their body with energy it needs.

FOOD CHAIN

Complete the food chain chart. Where does your animal fit into the chart? What other organisms are in this food chain?
MAJOR THREATS TO ECOSYSTEM

Describe a problem that threatens the plants and organisms in your ecosystem. Why is it a problem? What is being done to fix the problem? What will your animal need to do to survive this threat?

NOTE:

1. Be sure to apply all writing conventions (spelling, grammar, punctuation and capitalization) to your paragraphs.
2. You will be receiving 4 separate grades for this project. These grades will be for Writing, Science, Oral Communication, and Overall Project Score.
3. GLOs addressed are:
   a. Self-Directed Learner
   b. Quality Producer
   c. Effective Communicator
   d. Effective and Ethical Use of Technology
   e. Complex Thinker
4. Be sure to use your time wisely. Some class time will be used to work on your project. Be sure to have your flash drive and other necessary items with you at all Science classes.
5. Use the checklist provided to check off each component of the assignment you have completed and bring to each Science class.

IMPORTANT ANNOUNCEMENT!

ASSIGNMENT IS DUE: ________________

No late assignments will be accepted. If you are absent, please drop off the project to the office by: ________________

If you have any questions or concerns regarding the assignment, you can reach me by:

Phone: ____________________________

Email: ____________________________

PLEASE SIGN AND RETURN THE BOTTOM PORTION OF THIS PAGE TO THE TEACHER.

We have read and understand the above mentioned requirements. We understand the project is due on ________________ and no late assignments will be accepted after ________________.

Parent Signature: ____________________________

Student Signature: ____________________________