Skills Practice Lab

Comparing the Values of Species

Scientists estimate that there are 12,250,000 species on Earth, covering a much broader range than just plants and vertebrate animals (those with backbones). Many of these species remain unknown to us. For example, there are an estimated 8 million species of insects alone, only 950,000 of which have been identified. What are all these species worth to you? Most of us can appreciate the sheer beauty and vastness of nature, but many species play a larger role than their contribution to nature's wonder. Maintaining a variety of species enhances food production and protects our ability to raise food crops when some species are attacked by disease. Saving human lives can be tied directly to species diversity: one-fourth of all prescription medications contain ingredients derived from plants, and many organisms, from molds to plants to animals, have played a part in medical discoveries.

Unfortunately, many species are in danger of becoming extinct due to human activities. When a species becomes extinct, we lose whatever value that species had or may have had to humans. As a consumer of food and medical products, this should be a concern to you. But how is the decision made about which species to invest time and money into saving?

In this exercise, you will practice the skills of performing research on different species. You will collect data on their potential as a human food source, their potential for medical discovery, their affect on their ecosystem, and their risk of endangerment. Finally, you will do an option study to compare their relative value to each other based upon what you think is most important as a consumer. You will discover how complicated it can be to place value on species and make decisions about funding their survival.

OBJECTIVES

Collect data on several species regarding their value to you as a consumer and their risk of extinction.

Compare the relative values of the species you researched.

MATERIALS

- Internet access, if available
- notebook
- pencils or pens
- pictures and names of a wide variety of species from around the world

Comparing the Values of Species *continued*

Procedure

DAY 1

1. As a lab team, pick two animal species and two plant species on which to conduct consumer value research. Once you come to an agreement, write the names of the species in the spaces below.

Animal Species 1: _____

Plant Species 1: _____

Animal Species 2:

Plant Species 2:

2. Below is a list of four consumer value criteria with a series of questions that will help you understand each criterion. The consumer value criteria are based upon potential direct consumer impact (food and medicine), indirect consumer impact (ecosystem balance), and urgency of need (risk of extinction). Read and understand these criteria and questions prior to commencing your research.

Criterion 1: Potential as a Human Food Source (direct consumer impact)

Is it currently a food source used by humans?

Could it be used as a food source by humans?

Criterion 2: Potential for Human Medical Use (direct consumer impact)

Is it currently used for its medicinal properties by humans?

Is it currently used as a legal drug or in a legal drug?

Could it provide a medical breakthrough in the future?

Criterion 3: Affect on Ecosystem Balance (indirect consumer impact) Is it the only food source or one of few food sources available to another species in the ecosystem? If so, its extinction could put another species at risk for extinction.

Does it balance any other species either by its use of resources or its preying on other species? If so, its extinction could cause the populations of other species to grow out of control, depleting limited resources, putting other species at risk for extinction.

- Criterion 4: Risk of Extinction (urgency of need)
 - Are its numbers diminishing in its ecosystem?

Is there another species taking over its habitat or food sources? Does it exist naturally in relatively few locations worldwide?

3. As a lab team, determine the weight factors of each consumer value criterion prior to commencing your research. A weight factor is the importance to your lab team of a criterion relative to the other criteria. Give each criterion a weight factor of 0 to 10 (fractions may be used), 10 meaning highest importance, 0 meaning lowest importance. All four of the weight factors must add up to equal 10. Look over the examples in Table 1, then write your lab team's weight factors in the far right column.

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Class	 Date	
	-	

	Ex.: Extreme Conservationist	Ex.: Extreme Consumer	Ex.: Equal Weight	Your Lab Team
1: Potential Food Source	0.5	6.0	2.5	
2: Potential Medical Use	0.5	3.0	2.5	
3: Ecosystem Affect	4.5	0.0	2.5	
4: Risk of Extinction	4.5	1.0	2.5	

TABLE 1: CONSUMER VALUE CRITERIA WEIGHT FACTORS

Comparing the Values of Species continued

4. Using the Internet, if available, find up to 3 sources of information on each of your selected species and print them out.

DAY 2

Name ____

5. Divide the consumer value criteria between the lab team members, a different one to each member. Each lab team member is to read the information on each species and take notes in his/her research notebook relating to the consumer value criterion assigned to him/her. The research notes of each lab team member will be properly focused on their assigned criterion if he/she collects data to answer the questions associated with his/her assigned criterion. This process is most efficient if each lab team member starts with a different species, and then passes the information sources on the species to the right. Continue until all members have taken notes on all species.

Analysis

- **1. Explaining Events** Recall the discussion within your lab team when you selected your four species. What were the reasons for your team's selections? Are some of your species "cute"? Did one of your lab team members already know something about a species? Are the species popular (do many people know of their existence)? Explain.
- **2. Organizing Data** Apply a score to each species for the criterion given to you. Score as follows. Using your research notes, if you feel the answer to any one of the questions associated with the criterion is "definite evidence" for a species, give that species a score of 10 for that criterion. For "possible evidence," give a score of 5. For "no evidence," give a score of 0. Record your scores in Table 2. Each lab team member is to do this as an individual, not with the team. Do not show the other members the scores you are giving to each species until after everyone has scored all four species for their assigned criterion.

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Name	Class	Date					
Comparing the Values of Species continued							

Criterion	Animal Species 1	Animal Species 2	Plant Species 1	Plant Species 2		

TABLE 2: CRITERION SCORES OF INDIVIDUAL LAB TEAM MEMBER

3. Organizing Data Calculate the overall score for each species. For each criterion, record in Table 3 the weight factor and score for each species given by the applicable lab team member. Then, for each criterion, multiply the weight factor by the score for each species and record the results in the weight score columns. Then add all of the weight scores for a species and record the total for each species at the bottom. Check the calculations of each lab team member to make sure they come out the same. No total for a species should be larger than 100.

TABLE 3: CONSUMER VALUES OF SPECIES

		Animal Species 1		Animal Species 2		Plant Species 1		Plant Species 2	
Criterion	Weight Factor	Score	Weight Score	Score	Weight Score	Score	Weight Score	Score	Weight Score
1									
2									
3									
4									
		Total		Total		Total		Total	

Conclusions

4. Drawing Conclusions Draw a conclusion as to relative values of the four species that were researched by your lab team. Record them in order from most important to least important.

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TEACHER RESOURCE PAGE

Skills Practice Lab

CONSUMER-GENERAL

Comparing the Values of Species

Teacher Notes

TIME REQUIRED Two 45-minute class periods

SKILLS ACQUIRED

Collecting data Inferring Organizing and analyzing data

RATINGS

Easy \checkmark 1 2 3 4 \rightarrow Hard

Teacher Prep-3 Student Set-Up-1 Concept Level-3 Clean Up-1

THE SCIENTIFIC METHOD

Make Observations Procedure, questions 1–5 Analyze the Results Analysis, questions 1–3 Draw Conclusions Conclusions, question 4

MATERIALS

Provide a large variety of pictures and names of plants and animals for students to choose from. Be sure that pictures are labeled. Use photos if possible. Cover a wide range of organisms: slime molds, fungi, microscopic plants and animals, as well as the better-known larger species. Include some that are endangered and some that are not.

If Internet access or computer time is limited, that option can be eliminated. In this case, ensure that you provide reference sources on all animals and plants for the students to use for research.

TECHNIQUES TO DEMONSTRATE

You may need to demonstrate how to calculate a weighted score for Table 3. Use the formula: (weighted score) = (weight factor from Table 1) \times (score from Table 2)



TEACHER RESOURCE PAGE

Comparing the Values of Species continued

MISCONCEPTION ALERT

The process that students follow in the procedure for "scoring" the selected species is called an option study. In this case, students are studying the options of what species are most valuable to them using criteria that are most important to them. The students should follow this process exactly as described in the Procedure and Analysis sections. This ensures that they come up with results that are not skewed by one person's opinion.

TIPS AND TRICKS

Lab teams should be limited to four students. If there must be more than four students to a team, have students double up on assigned criterion in Procedure step 5 and score the species in Analysis question 2 as normal. Then have the students with the same assigned criterion average their scores before they are entered into Table 3 of Analysis question 3.

To ensure that all students are busy doing research at the same time in Procedure step 6, each lab team member should start with a different species, read and take notes on that species, then "pass the species to the right." This process continues until all lab team members have taken notes on all species.

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