



Science Objectives

- Students will explore a model to understand how matter and energy are transferred among producers, consumers, and decomposers in an ecosystem.
- Students will explore how the number of organisms in different trophic levels affects the stability of an ecosystem.



Vocabulary

- producer
- consumer
- secondary consumer
- tertiary consumer
- population
- community
- trophic level
- ecosystem
- predator
- prey

About the Lesson

- In this lesson, students will:
 - Describe how energy is transferred through an ecosystem.
 - Explain how organisms depend on one another to create a balanced ecosystem.



TI-Nspire™ Navigator™

- Send out the *Paradise_Island.tns* file.
- Monitor student progress using Class Capture.
- Use Live Presenter to spotlight student answers.

Activity Materials

- Compatible TI Technologies:  TI-Nspire™ CX Handhelds,  TI-Nspire™ Apps for iPad®,  TI-Nspire™ Software

Tech Tips:

- This activity includes screen captures taken from the TI-Nspire CX handheld. It is also appropriate for use with the TI-Nspire family of products including TI-Nspire software and TI-Nspire App. Slight variations to these directions may be required if using other technologies besides the handheld.
- Watch for additional Tech Tips throughout the activity for the specific technology you are using.
- Access free tutorials at <http://education.ti.com/calculators/pd/US/Online-Learning/Tutorials>

Lesson Files:

Student Activity

- Paradise_Island_Student.doc
- Paradise_Island_Student.pdf

TI-Nspire document

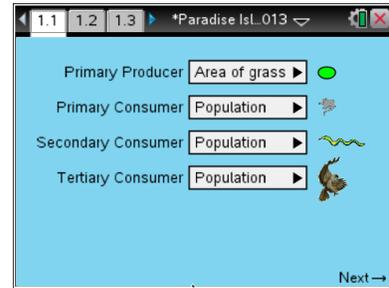
- Paradise_Island.tns



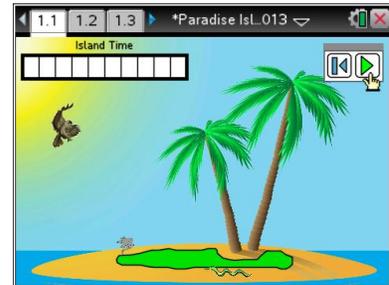
Discussion Points and Possible Answers

Move to page 1.2

1. The goal is for students to correctly set the initial populations of a variety of organisms to ensure that they all survive for a minimum of 10 years. Students will use the drop down menus to select the initial values for each population. Once students have done this, they will select NEXT → at the bottom left corner of the screen. Then, they should select the Play button  to run the simulation.



2. Have students observe the outcome of the initial population values. If all of the organisms on the island die before 10 years have passed, the student can select the Reset Button  and try again with new values. Students should continue to select new outcomes until all populations can be sustained on the island for 10 years. Note: If students are struggling to create a successful outcome, a discussion of the correct balance of organisms within an ecosystem may be necessary to point them in the right direction.



3. Once all populations are alive for 10 years, the students will explore the graphs on pages 1.3 -1.6 and the spreadsheet on 1.7 to see how each population fluctuated. Note: Students should not select the reset button once they have successfully run the simulation or you they delete all of the data from the graphs.



Tech Tip: If students are unable to view the entirety of the data on pages 1.3 - 1.6, have students select  > **5: Window/Zoom > 2: Zoom-Data.**



Tech Tip: To access the Directions again, select  or **Document Tools () > Paradise Island > Directions.**



Tech Tip: To access the Directions again, select  > **Paradise Island > Directions.**



Move to page 2.1.

Have students answer question 1 - 11 in the .tns file, the activity sheet, or both.

Q1. Identify the ecological role of the following organism: grass

Answer: A. producer

Q2. Identify the ecological role of the following organism: mouse

Answer: B. primary consumer

Q3. Identify the ecological role of the following organism: snake

Answer: C. secondary consumer

Q4. Identify the ecological role of the following organism: hawk

Answer: D. tertiary consumer

Q5. Describe the scenario that would sustain the island's ecosystem for 10 years.

Sample Answer: There would need to be a high amount of producers, a lesser amount of primary consumers, an even lower numbers of secondary consumers, and the lowest amount of tertiary consumers.

Q6. Based on your response to question 5, why is this ecosystem successful? Use evidence from the scenario and graphs to defend your answer.

Sample Answer: There would need to be a large number of producers to feed the primary producers and enough organisms on each level to feed the level above it. If any of the trophic levels disappeared, the levels above it would also disappear.

Q7. Describe a scenario that would not sustain the island's ecosystem for 10 years.

Sample Answer: There would an imbalance in the number of organisms in each trophic level. For example, there might be too many primary consumers and not enough producers.



Q8. Based on your response to question 7, why is this ecosystem unsuccessful?

Sample Answer: If there were too many primary consumers and not enough producers, there would not be enough food energy for the primary consumers to live. Thus, their population would decrease and possibly die off. This would then cause organisms at higher levels to die as well.

Q9. What trophic level would have the most number of organisms?

Answer: A. producer

Q10. What trophic level would have the least number of organisms?

Answer: D. tertiary consumer

Q11. Justify your answers for questions 9 & 10.

Sample Answer: Producers will have the highest numbers to provide the energy needed to other trophic levels. The tertiary consumers have the least number of organisms because food availability and energy are lost through the trophic levels.



TI-Nspire Navigator Opportunities

Make a student a Live Presenter to illustrate how to change the initial values of the different populations. Throughout the activity, monitor student progress. At the end of the activity, collect the .tns file and save to Portfolio.

Wrap Up

When students are finished with the activity, retrieve the .tns file using TI-Nspire Navigator. Save grades to Portfolio. Discuss activity questions using Slide Show.



Assessment

- Formative assessment will consist of questions embedded in the .tns file. The questions will be graded when the .tns file is retrieved. The Slide Show will be utilized to give students immediate feedback on their assessment.
- Summative assessment could consist of questions/problems on the chapter test or a performance assessment involving the creation of their own model demonstrating the trophic levels of a local ecosystem.