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| **Science Objectives** * Students will develop a model to show how matter and energy are transferred among producers, consumers, and decomposers as the three groups interact in an ecosystem.
* Students will describe the conservation of matter and flow of energy into and out of various ecosystems, and define the boundaries of the system.

**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 .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
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| **Discussion Points and Possible Answers**Have students read the background information stated on their activity sheet. |
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| **Move to page 1.2.** |
| 1. After reading the instructions on page 1.3, students should then close the directions box by selecting .2. The goal is for students to choose the best number for each population to ensure their survival for a minimum of 10. Students will use the drop down boxes to select the amount for each population that they think will provide the right balance for the island.3. Students will click on NEXT 🡪 at the bottom left corner of the screen and observe the outcome of the choices by pressing the Play button . If that choice does not work, the student can click the Reset Button  and try again. Continue to select new outcomes until all populations can be sustained on the island for 10 years.4. Once all populations are alive for 10 years, the students will explore the graphs on pages 1.3 -1.6 and the table on 1.7 to see how each population fluctuated. If the data is hard to read on the graphs, select b and select 5: Window/Zoom then 2: Zoom –Data. |  |
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| **Tech Tip:** To access the Directions again, select **> Directions** |
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| **Move to page 2.1.**Have students answer question 1-11 in the .tns file, the activity sheet, or both.Q1. Identify the ecological relationship of each the following organism: Grass**Answer:** A. ProducerQ2. Identify the ecological relationship of each the following organism: Mouse**Answer:** B. Primary ConsumerQ3. Identify the ecological relationship of each the following organism: Snake**Answer:** C. Secondary ConsumerQ4. Identify the ecological relationship of each the following organism: Hawk**Answer:** D. Tertiary ConsumerQ5. What is a scenario that would sustain the island’s ecosystem for 10 years?**Sample Answer:** Answers may varyStudent answers should reflect that there would need to be high numbers in the population of producers, less in the primary consumers, even lower numbers in the secondary consumers and the lowest in the tertiary consumers.  |
| Q6. Based on your response from question 5, why is this ecosystem successful? Use evidence from the scenario and graphs to defend your answer.**Sample Answer:** Answers may varyStudent answers should reflect that 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 any other levels above it would also disappear. Q7. What is a scenario that would not sustain the island’s ecosystem for 10 years?**Sample Answer:** Answers may varyStudent answers should reflect that there would an imbalance in the number of organisms in each trophic level. Q8. Based on your response from question 7, why is this ecosystem unsuccessful? Use evidence from the scenario and graphs to defend your answer.**Sample Answer:** Answers may varySee answer to Q6Q9. What tropic level would have the most number of organisms?**Answer:** A. ProducerQ10. What tropic would have the least number of organisms? **Answer:** D. Tertiary ConsumerQ11. 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 due food availability and energy lost through the trophic levels. |
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| **TI-Nspire Navigator Opportunities**Make a student a Live Presenter to illustrate show how to move the sliders. 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.