LESSON 1: JUST ANOTHER DAY IN THE HOOD
AN INTRODUCTION TO SYMBIOTIC RELATIONSHIPS IN THE
CORAL REEF ECOSYSTEM

INTRODUCTION
This lesson introduces the idea of interrelationships among organisms and how these could help them persist in a coral reef ecosystem. Students will learn about symbiotic relationships, with mutualism among coral and zooxanthellae as the model organisms in this first lesson. Topics include the transfer of energy and matter through the processes of photosynthesis and respiration. These concepts are approached through the marine environment, rather than the terrestrial environment, which allows most students to take a step out of their comfort zone. Teaching these concepts with examples from the coral reef ecosystem is also a great way to incorporate ocean literacy into the classroom.

This lesson works well as an INTRODUCTION or REVIEW of these processes. Please implement additional classroom activities that will complement the concepts discussed in this unit. This unit was written primarily for seventh graders, but adjustments can be made to fit any grade level.

OBJECTIVES
• Students will expand their scientific knowledge in the general ecology of coral reef ecosystems.
• Students are expected to understand the importance of symbiosis, consumers, producers, energy, matter, photosynthesis, and respiration.
• Students will be challenged to think logically and discuss questions in the prompt.
• Students will be prepared to develop their own hypothesis and methods based on symbiotic relationships in subsequent lessons.
• Students will have an introduction to the research site and topics of Lessons 2 and 3.

HAWAII STATE DEPARTMENT OF EDUCATION BENCHMARKS
7.3.1 Cycles of Matter and Energy
• Explain how energy moves through food webs, including the roles of photosynthesis and cellular respiration.
7.3.2., 7.3.3 Interdependence
• Explain the interaction and dependence of organisms on one another.
• Explain how biotic and abiotic factors affect the carrying capacity and sustainability of an ecosystem.
7.4.2 Cells, Tissues, Organs, and Organ Systems
• Describe the basic structure and function of various types of cells.
7.5.4 Unity and Diversity
• Analyze how organisms’ body structures contribute to their ability to survive and reproduce.

NATIONAL SCIENCE EDUCATION STANDARDS
Grades 5 – 8
B. Physical Science

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BACKGROUND

The scientists we will encounter in lessons 2 and 3 have been studying different organisms that participate in “symbiosis.” Symbiosis is a close relationship between two organisms. Many symbiotic organisms share a living space. The “symbiont” is usually the smaller organism and a “host” is usually the larger organism in a symbiotic relationship. Corals and zooxanthellae have a mutualistic relationship, in which both benefit from the interaction. Corals (consumers) receive some energy from zooxanthellae (producers), which is stored in the glucose that the zooxanthellae produce during photosynthesis. The rest of their energy (and nutrients) is obtained from their food, zooplankton, which they catch with their stinging tentacles. Zooxanthellae, on the other hand, receive protection from a coral’s hard skeleton and stinging cells. Zooxanthellae also use some coral waste (from respiration) as nutrients. This allows matter to be recycled in a system. Energy changes forms but does not get used up. It begins as light energy, then is converted into chemical energy during photosynthesis (energy is stored in food), and is released into the atmosphere as heat when respiration is complete.

MATERIALS

- Powerpoint presentation (downloadable off the Coral Reefs of Moorea website)
- Paper
- Pencils

PREPARATION

- Secure PowerPoint and projector capabilities in your classroom.
- Review the downloadable PowerPoint presentation and become familiar with the pace and vocabulary.

ACTIVITY

- Please allow 1-2 class periods to complete this lesson.
  - Work your way through the PowerPoint presentation with your class.
  - Students may work in groups or individually when brainstorming hypotheses and research methods.
  - Vocabulary words are in italics. Please have students copy the word and come up with their OWN definition of what they feel fits best. Be sure to review the vocabulary at the end of each slide, and have them make adjustments to their definitions if needed. The more they think about how to use the word, the more it will be stored in their memory. Repetition is
another way to promote vocabulary enhancement, so you may see some of the same vocabulary words repeated throughout the lessons.

**EXTENSIONS**
Perform this lesson in conjunction with the other lessons in this unit.

**REFERENCES**

**Text**
Vocabulary and teaching techniques throughout this unit were adapted from:

**Photos**
6. Withy-Allen, Kira. University of California, Santa Barbara and University Laboratory School, University of Hawaii at Manoa (Slides 1, 9, 16, 24, 41).