Objectives: 1) To test for prior unit content knowledge; 2) to consider the vulnerability of human and other species in relation to climate change, consumerism, ancient communities and future resource management; 3) Optional: to experience and enjoy nature

<table>
<thead>
<tr>
<th>Minutes</th>
<th>Suggested Sequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-10</td>
<td>1. PRE-TEST: Future Resource Management – write the questions on the board or give students a hand-out and read each question aloud while they write answers on paper. Do not include student scores in their final unit grades as the pre-test is designed to assess their prior knowledge only.</td>
</tr>
<tr>
<td>3-6</td>
<td>2. LECTURE: Polyps &amp; People: Vulnerable Species (see Teacher’s Notes below); Optional: view the “350” online film or ask a student to draw the CO2 graph on the board).</td>
</tr>
<tr>
<td>15-30</td>
<td>3. READING &amp; DISCUSSION: give students the “Empire to ‘Aha” handout to read pages 1-2 silently or as a class; then hand out page 3, “Reading Reaction: More about Earth Communities”, and assign 4 or more small groups 1 or 2 quotes to read and discuss; as a class, end the discussion with the questions on the bottom: “What are your beliefs &amp;/or concerns about the future? What good can our class discussions do?” If responses are negative, encourage students that more lessons in this unit may change their perceptions (see below) – high school activities are causing teens to join and even lead more grassroots movements which will result in green-collar jobs and a better future for them as adults.</td>
</tr>
<tr>
<td>10+</td>
<td>6. Optional: FIELD TRIP PREP: students may be more likely to actively pursue careers &amp;/or live pono in human/nature ecosystems if they are given the opportunity to experience nature. Have students plan an in-class or all day field trip (e.g. hike to a local place of beauty &amp; simply reflect on the year’s learning, the future of this ‘āina and community, etc.)</td>
</tr>
</tbody>
</table>

**Total = 49+ min**

**Materials:**

- For teacher: Optional: Internet access & projector (or 1 computer for every 4 students)
- For students: 1 3-page handout each: “Empire to ‘Aha”
- Safety: n/a
### Assessment/Performance Indicators:

- **Informal assessment:** Participation in Pre-Test, Lecture, Reading, Group Activity and Discussion; *optional*
  - Participation in field trip planning and/or viewing online films

- **Formal assessment:** none

### Suggested Points:

- 10 points possible for participation
- 9+ insightful; 8+ engaged; 6.5+ adequate; 6 or below inadequate

### Exceeds Expectations:
- Pre-test is completed; notes are taken on lecture and group discussions (& *optional* trip planning &/or film viewing);
  - overall participation shows insight & engagement in learning

### Meets Expectations:
- Pre-test is attempted; lecture is attended to; reading is completed; spoke & listened in group discussions (& *optional* trip planning &/or film viewing);
  - overall participation shows adequate attention and at least 2/3rd of time on task

### Needs Improvement:
- Participated less than 2/3rd of the time in pre-test, lecture, reading, group discussion &/or *optional* trip planning &/or film viewing;
  - overall participation shows insufficient attention and time on task

### Learning Styles:

- ✓ Left Brain  ✓ Right Brain  ✓ Auditory  ✓ Visual  ✓ Kinesthetic/Tactile  ✓ Spatial

### Enrichment/Extension:

- Eco-Solutions Reading Activity – this is a boldly worded essay which may get more apathetic students attention. The activity divides the reading into segments for small groups and guides discussion.
- Research coral – see the unit Appendix document “Coral-Food Web Activities” for many online resources to extend coral research, plus a class activity with Food Web Species cards
- Read more about “The Story of Stuff” – go to [www.storyofstuff.com/resources.html](http://www.storyofstuff.com/resources.html) or this unit Appendix on the disk to view the Fact Sheet, Annotated Script, Glossary, Another Way (Solutions) and more.

### Keywords:

- ‘Aha, CO₂, coral, earth community, empire, green collar jobs, food web, natural resource management, parts per million, ppm, polyps, Story of Stuff
Unit 10 Pre-Test: Future Resource Management

1. How are humans like coral?
2. How can the ancient Hawaiian concept of the 'aha help us in this century?
3. What is the Hawai'i 2050 Plan all about?
4. Give an example of something a scientist or science student would be likely to advocate for in Hawai'i today.
5. Can legislative testimony improve environmental problems? How or how not?

Answer KEY

1. Humans and coral are animals that live in complex communities which are vulnerable to climate change.
2. The 'aha represents group resource management and individual expertise. It helped ancient ahupua'a maintain sustainable practices and its principles may help us regain sustainability in the future.
3. The Hawai'i 2050 Plan was submitted to legislature in 2008 to make the state take action towards more sustainable practices over the next 4 plus decades.
4. Scientists and students are likely to advocate for sustainability, conservation and research.
5. Legislative testimony can help change bills into laws which better address problems, however, not all testimony is successfully delivered or received.

Teacher's Notes for Unit 10, Lesson 1

Polyps & People: Vulnerable Species

Corals tolerate a narrow temperature range between 25 degrees Celsius and 29 degrees Celsius depending on location. Corals bleach in response to prolonged temperature change and not due to rapidly fluctuating temperatures. Lab experiments show that corals bleach when water reaches a constant 32 degrees Celsius.

Humans are luckier and have proven we can live in a temperature range from -45 degrees to +45 degrees Celsius (this is about -50 to 110+ Fahrenheit) and even a little beyond these extremes.

However, something else we can measure in the atmosphere will also effect temperatures and threatens corals, humans and every other living thing on Earth: CO₂

350 is the number leading scientists say is the safe upper limit for carbon dioxide – measured in “Parts Per Million” or “ppm” – in our atmosphere. 350
ppm is the number humanity needs to get back to as soon as possible to avoid runaway climate change. View the 90 second film for speakers of any language at: http://www.350.org/en/animation and to see more. You can also view this video at: http://www.youtube.com/watch?v=s5kg1oOq9tY&eurl=http%3A%2F%2Fwww%2E350%2Eorg%2F&feature=player_embedded

- Ask students: What does problem does this video identify? (answer: Too much CO₂ is going into our air & putting us all at risk)
- Ask: What solution to the problem does this video suggest? (answer: If we tell everyone to take action against this, we’ll reduce the risk to our climate, ourselves and our environment)

What is the current level of CO₂ in Earth’s atmosphere now? 387 ppm!

QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.

Does this mean we’re all doomed? Not yet, but nearly! www.350.org tells us: “We’re like the patient that goes to the doctor and learns he’s overweight, or has high cholesterol. He doesn’t die immediately—but until he changes his lifestyle and gets back down to the safe zone, he’s at risk for heart attack or stroke. The planet is in its danger zone because we’ve poured too much carbon into the atmosphere, and we’re starting to see trouble signs: melting ice caps, spreading drought. We need to scramble back as quickly as we can to safety.”

Read more about what people around the world must do and are doing to solve this problem at: http://www.350.org/understanding-350#3