**BIOL101 Biology and Society**

**Understanding Global Climate Change**

**Part II: The Past**

***In order to understand the present, we must look to the past.***



Climate change is a global issue, with consequences not just for humankind but for all living things. Indigenous knowledge is understanding gained by a people through their practical experience with a place. For many indigenous peoples around the world, their attentiveness to nature is born of subsistence living, in which they rely on natural resources for food, clothing, and shelter. They harvest natural resources from the land and water using traditional methods and a deep knowledge of the geography, climate, and wildlife of their local area.   
  
Hawaiians lead their lives closely connected with nature—spiritually, culturally, and emotionally - and have long recognized and celebrated the connectedness among all natural things. Like other indigenous cultures, they have survived for thousands of years by living close to the land and by adapting to changes in climate and weather, as well as the availability of plant life and wildlife. Although modern technological advances have done a great deal to insulate us and protect us from the discomforts and hazards of the natural world, it has also disconnected us from much of our surroundings. In a warming world, those who are close to the land often see changes in plants, animals, and weather that many people who have lost their connection with nature cannot. Native knowledge emerges from observations and experiences in these environments, and the traditional Native ways of understanding and relating to the world, which have been shaped by a holistic understanding of the Earth system, hold valuable lessons for those willing to observe, listen, and experience.

**EXERCISE 1: Nā Kilo ʻĀina(Observing Your Place)**

“*Kilo*” means to watch, observe, examine or forecast. It can be referred to the action of watching or to a person that is an expert in these skills. Kilo also references a Hawaiian observation approach which includes watching or observing our environment and resources by listening to the subtleties of place in order to help guide decisions for management and p*ono* (just) practices. With the impacts of climate change, it is imperative that we understand and abide by practices which support the environment, including best times to harvest areas or species or to allow them to rest. By supporting the cultural practice of kilo, we can establish and deepen intimate relationships between people and place (supporting more awareness of the environment), and provide a community with guidance to support sustainability, health and wellness, and mālama ‘āina (participation in caring for our resources).

How aware are you of your local environment? Can you observe the interconnectedness of elements of the natural world? A good way to start is with the practice of kilo. Observation of the natural environment - whether taken in a park, in your backyard, or by the ocean - provide ideal opportunities to develop and refine your powers of observation. After all, how can you tell if the environment around you is changing if you don't know what it looks like, sounds like, or feels like? Follow the directions for this exercise below:

1. Think of a favorite place/location that you can visit outdoors - somewhere that is meaningful to you or to your family.
2. *Before* going to this place, write down as much as you can think of or remember about the place, the environment there, and its meaning to you.
3. To begin this activity, gather the following materials:

* Pen or pencil
* A journal or paper for notes - note taking allows you to record what you observe.
* A sketchbook or blank paper to make drawings - drawings are as valuable as words in the field notes that scientists and naturalists jot down. (Note: The journal and sketchbook can be one and the same).
* A watch or timer (if you choose to use your phone, make a commitment that you will only use it for timing the experience).
* (Optional) Other field equipment - binoculars or a magnifying glass, if available, can help you see details you might otherwise miss.

1. Next, go to your chosen place location. You will need to spend at *least* twenty minutes minimum there, up to an hour. With your journal and sketchbook in hand, get settled in and set your timer or watch for 20 minutes.
2. Record what you see and focus on during your time there, as well as your thoughts as they strike you. Give your full attention to the natural world around you. Engage your senses: Stop, look, and listen, but also smell and touch.
3. As you consider all that’s happening around you, write down your thoughts. Here are some questions you might address:

* Where is the Sun in the sky? Is the Moon visible?
* What kinds of life are apparent? Try to list at least 10 examples of living things.
* In what ways does the natural environment support life?
* Is there water? Where does it come from? Where does it go?
* What is the ground surface like? Is plant growth lush, or is the ground barren or paved over? If the ground is unpaved, what color is the soil? What does it feel like in your hands? How does the surface support or fail to support life?
* What can you smell? What can you hear? Which of these come from nature?
* Can you imagine the history of the place and how it came to be? Describe.
* How has this place changed over the years? Has it been threatened or even destroyed in parts?
* What other notes or observations can you make?

1. Once you have finished, if you would like, using the camera on your phone or audio recorder, you can record photos or sounds from your place. You can use these in your assignment you will turn in.
2. Once you've returned to your computer, report on what you experienced. Write a 1-2 page description of your experience (12-point font, double-spaced), incorporating answers to the following questions into your paper. Turn this in before class begins.
   1. Where was your chosen location?
   2. Why did you choose this location? What made it meaningful to you?
   3. Compare the description you made of your environment before your visit with the kilo you made during your time there. How were they the same? How were they different?
   4. What were you able to see/hear/sense when you focused your attention on your natural surroundings? Did you discover anything in your outdoor environment that surprised you? For example, animals you did not expect to see? Sources of pollution you never knew existed? Noises that you could not identify?
   5. Has your place changed since you visited there for the very first time? If so, describe how. How might it be changed in the future due to human (or natural) activities?
   6. Discuss how your perspective, appreciation, or opinion of nature may have changed as a result of this activity. Explain whether you felt that your daily routine was disengaged from nature, and whether this conscious effort to kilo the environment affected that sentiment. Can you better relate to the Native perspective that nature and humankind are interconnected?
   7. Native people warn that much of what is sacred to them is in jeopardy because of the attitudes and actions of non-native people with respect to Earth. How might the act of reconnecting with nature help preserve sacred or special places?

**EXERCISE 2: Lessons from the Past**

With over three decades of experience in Hawaiian ecology, Dr. Samuel ‘Ohukani‘ōhi‘a Gon is a leading expert in biological research, field ecology, entomology, ethology, natural community classification, and ecological modeling. As a kahuna kākalaleo, a practitioner of Hawaiian chant and protocol, he has circled the globe in his quest to blend culture and conservation, acre by acre. As a senior scientist and cultural advisor of The Nature Conservancy of Hawai‘i, he has been instrumental in many facets of conservation work on the islands. Sam strives to blend the richness of unique Hawaiian ecosystems with the equally rich culture that developed here.

In class, we will watch a TED talk video (13:49), “[Lessons from a Thousand Years of Island Sustainability](https://www.youtube.com/watch?v=l9fv_2XIJBk),” by Dr. Gon. As you watch the video, answer the questions on the next page.

1. What is the Holdridge Lifezone System and how many lifezones does Hawaii have? Why is this important or meaningful?
2. Dr. Gon describes how the science of landscape ecology can help us to understand the past and the present of the Hawaiian islands. How has the landscape of the islands and the ecological footprint of the inhabitants changed from a) 3000 years before people; b) pre-contact Hawaii; to c) the present?
3. Identify and explain three factors that allowed Native Hawaiians to “thrive in a limited island system without destroying the environment or losing their self-sufficiency” as described in the video.

1. How have the past and most recent voyages of the traditional canoe, Hōkūleʻa, played a role in the identity of Hawaiians and demonstrated the ways in which Hawaiian values and relationships with their environment can be a model for sustainability of our “Island Earth?”

1. Dr. Gon describes the idea of aloha ʻāina - to form a deep appreciation and love of the land and our relationship with it, in order to better understand the sacredness of the world. How does the idea of aloha ʻāina change the relationship of humans with their environment?

**EXERCISE 3: Listening to Voices of the Past to Inform the Present**

In order to understand the impacts of our present-day choices on the future, we can look to the past to determine how our environment has changed. The phrase "multiple ways of knowing" includes logical knowledge forms (**articulate knowledge**) that result from rational intellect, technical analysis, and reason, as well as intrinsic knowledge forms (**tacit knowledge**) that result from experience, instinct, perception, cultural practice, intuition, and emotion (Dampney et al. 2002; Brown et al. 2012). Both of these types of knowledge can be key data in understanding and managing the environment around us (Larsen et al. 2018).

Tacit knowledge is largely experiential and often place-based in that it is achieved through direct person-to-person and person-to-nature interactions (Brown et al. 2012). Although at times it can be challenging to define or quantify, tacit knowledge forms are often stronger drivers of human behavior than articulate knowledge forms (Kahan et al. 2012). If we want to understand how to alter the trajectory of climate change in the future, we need to create context for those of us in the present by listening to, and valuing, the voices of the past. Ingold (2011:21) states that “information, in itself, is not knowledge, nor do we become any more knowledgeable through its accumulation. Our knowledgeability consists, rather, in the capacity to situate such information, and understand its meaning within the context of direct perceptual engagements with our environments."

We have examined and learned much from the articulate knowledge-base that is available to us through the data that scientists have collected over time and across the globe, and in our next activity, we will be using this data to project scenarios of climate change in the future. To broaden our scope and use of these data, we will collect tacit knowledge from kupuna (elders) within our community about how the climate of our own island has changed over time. As you do this exercise, consider how these different methods of data collection about the environment complement each other.

The following video segment features student filmmakers from Haskell Indian Nations University. Their film project, titled *Where Words Touch the Earth*, is a vehicle to share indigenous wisdom with other Native students and with the broader population who view their work. Watch the short video [here](https://hawaii.pbslearningmedia.org/resource/nasa09.la.rv.visual.students/native-student-filmmakers-focus-on-climate-change/) (1:53).

*We are the ones that can provide the information that affects us specifically, but our people need to hear it from us.*– Marei Spaola

For this exercise, you will record and evaluate your own observations about changes you’ve noticed in the environment, and interview an older member of your own community or ʻ*ohana*  (family) about changes they've noticed and how they feel about those changes. These data will be collected over time, forming a data and video archive of observations and tacit knowledge about changes in the environment in our community. In other words, it is an opportunity to tell a story about what's happening and to have the words and/or images you capture collectively tell a story that can help to raise awareness among a broader population, many of whom may not recognize what is happening around them.

*Instructions*:

1. This activity will have three parts. First, you’ll record a short (up to five minute) video on your own observations of changes in the environment or weather. Second, you’ll interview a community or family member about their observations, and lastly, you’ll work in a group with other students to identify themes that emerge from this data.
2. Identify a family or community member that you would like to interview. Ideally, someone who is older is better (i.e. grandparents, or other kupuna), but parents will also work. Let them know about this project, and ask your interviewee if they are willing to be recorded, either by audio or video recording. If so, please have them fill out the waiver in the folder for today’s class. If not, you may just record their answers on paper.
3. Review the questions for this activity, filling in and adding your own question at the end. You may want to write the questions down and give them to your interviewee ahead of time so that they can think about what they’d like to say before recording their answers.
   1. Please state your name, age, where you are from, and where you currently live.
   2. What changes have you noticed in your area that could be attributed to climate change in the area where you live or places that you consider important to you? Please list the changes you have noticed and also discuss why you think these changes are happening.
   3. Have you noticed any changes in either plant or animal species in your area that may be attributed to climate change? If so, what are they, and how have these species changed?
   4. Can you think of any evidence of changing weather or seasonality that impacts activities in your community?
   5. How do you think that climate change can affect a person emotionally, physically, and/or financially?
   6. What have your own parents, grandparents, or other elders in your community told you about changes in weather patterns or animals and plants here over time?
   7. What behavioral changes (if any) do you think we, as humans, can make that might make a difference in the future?
   8. Is there anything else you’d like to share?
   9. Make up one question of your own and write it in the space below:
4. First, record a video of *yourself* answering the questions listed above. If you would like your video to be kept as part of the archive, please include a signed copy of the waiver for yourself.
5. Next, record your interviewee answering the questions (via either audio, video, or on paper).
6. Go through both of your recordings, and transcribe, or write down, what was said in each of your interviews. Next, identify the main ideas expressed by you and your interviewee. To do this, you can use ***coding*** and look for common words, expressions, or themes. Using the highlighter function on google docs, you can even color code common words into groups or similar themes and count the number of times they come up to quantify your data (your instructor will demonstrate this technique). Enter your themes into the “Recording the Impacts of Climate Change in Hawaii - Individual Data Sheet” (Attachment B). You will need this data when you do the class group work during our next class period, so please bring your data with you. Use additional sheets as needed.
7. In class, and working in your group, meet in a breakout room and share the observations you have collected. Using the attached table, identify themes that emerge from the entire group’s interviews. As a group, enter your observations in the spreadsheet titled “Recording the Impacts of Climate Change in Hawaii - Group Data” (Attachment C). Use additional sheets as needed.
8. Examining your data, answer the following questions: *How could scientists support the observations of kupuna using scientific data? Why are both sources of information important in developing a broad understanding of climate change and its consequences?*
9. Upload the following to the class website for today’s class period, titled with your full name and the name of the assignment you are turning in:
   1. Your video(s) and/or recordings (paper or audio) of you and your interviewee
   2. Coded transcripts of your two interviews
   3. Any signed waivers
   4. Your individual and group’s tables

*References:*

Brown PR, Jacobs B, Leith P. (2012). Participatory monitoring and evaluation to aid investment in natural resource manager   
 capacity at a range of scales. *Environ Monit Assess.* 184:7207-7220.

Dampney C, Busch P, Richards D. (2002). The meaning of tacit knowledge. *Australasian J of Information Systems.* doi:   
 http://dx.doi.org/10.3127/ajis.v10i1.438

Kahan DM, Peters E, Wittlin M, Slovic P, Ouellette LL, Braman D, Mandel G. (2012). The polarizing impact of science literacy and   
 numeracy on perceived climate change risks. *Nat Climate Change*. 2:732-735.

Ingold T. (2011). The perception of the environment: essays on livelihood, dwelling and skill, 2nd edn. Routledge, London.  
Laursen S, Puniwai N, Genz AS, Nash SAB, Canale LK, and Ziegler-Chong S. (2018). Collaboration across worldviews: managers   
 and scientists on Hawaiʻi Island utilize knowledge co-production to facilitate climate change adaptation. *Environmental   
 Management.* 62(4): 619-630.