Lesson/Unit Title: **Hawaiian Oceans in a Warming Climate**

INTRODUCTION

CREATED BY	**DR. SHARON PRICE SCHLEIGH**
SUBJECTS	**DIRECTLY**: SCIENCE/ENGINEERING, ENGLISH LANGUAGE ARTS, & SOCIAL STUDIES **INDIRECTLY**: ART, HAWAIIAN LANGUAGE READINESS, COMPUTER SCIENCE SKILLS, HEALTH, EDUCATION & MATH
GRADE LEVEL	6TH, 7TH 8TH
DURATION	840 MINUTES OR 11 DAYS OF 60 MINUTE PERIODS & 1 DAY OF 180 MINUTES
STANDARDS	AS A PROJECT-BASED, PLACE-BASED UNIT, THIS PLAN INCLUDES MULTIPLE STANDARDS FROM ALL SUBJECT AREAS THAT THE STUDENTS **COULD** MEET IN COMPLETING EACH PART OF THE PROJECT. STANDARDS FOR EACH SUBJECT ARE LISTED AS THEY ARE APPLIED WITHIN EACH LESSON. **NEXT GENERATION SCIENCE STANDARDS (NGSS)** ● MS-LS1-5. CONSTRUCT A SCIENTIFIC EXPLANATION BASED ON EVIDENCE FOR HOW ENVIRONMENTAL AND GENETIC FACTORS INFLUENCE THE GROWTH OF ORGANISMS. ● MS-LS2-2. CONSTRUCT AN EXPLANATION THAT PREDICTS PATTERNS OF INTERACTIONS AMONG ORGANISMS ACROSS MULTIPLE ECOSYSTEMS. ● MS-LS2-4. CONSTRUCT AN ARGUMENT SUPPORTED BY EMPIRICAL EVIDENCE THAT CHANGES TO PHYSICAL OR BIOLOGICAL COMPONENTS OF AN ECOSYSTEM AFFECT POPULATIONS. ● MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. ● MS-LS2-1.C Cause and effect relationships may be used to predict phenomena in natural or designed systems. ● MS-LS2-1.2. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). ● MS-LS2.A1: Interdependent Relationships in Ecosystems. Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. ● MS-LS2.A2: Interdependent Relationships in Ecosystems.In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. ● MS-LS2A3. Interdependent Relationships in Ecosystems. Growth of organisms and population increases are limited by access to resources. ● MS-LS2-5. EVALUATE COMPETING DESIGN SOLUTIONS FOR MAINTAINING BIODIVERSITY AND ECOSYSTEM SERVICES . ● MS-ESS3-4. CONSTRUCT AN ARGUMENT SUPPORTED BY EVIDENCE FOR HOW INCREASES IN HUMAN POPULATION AND PER-CAPITA CONSUMPTION OF NATURAL RESOURCES IMPACT EARTH'S SYSTEMS. ● MS-ESS3-5. ASK QUESTIONS TO CLARIFY EVIDENCE OF THE FACTORS THAT HAVE CAUSED THE RISE IN GLOBAL TEMPERATURES OVER THE PAST CENTURY. ● MS-D3P.5A. Using Mathematics and Computational Thinking. Using mathematics as tools for representing physical variables and their relationships, including constructing simulations, statistically analyzing data, and recognizing, expressing, and applying quantitative relationships. ● MS-D3P.5B. Mathematical and computational Thinking. Applies predictions of the behavior of physical systems, along with the testing of such predictions to statistically assess the significance of patterns or correlations. **ENGINEERING STANDARDS** ● MS-ETS1-2. EVALUATE COMPETING DESIGN SOLUTIONS USING A SYSTEMATIC PROCESS TO DETERMINE HOW WELL THEY MEET THE CRITERIA AND CONSTRAINTS OF THE PROBLEM. • MS- ETS 1-3. Analyze data systematically, either to look for salient patterns or to test whether data are

consistent with an initial hypothesis.
• MS- ETS1-4. Recognize when data are in conflict with expectations and consider what revisions in the initial model are needed.
• MS-ETS1-5. Use spreadsheets, databases, tables, charts, graphs, statistics, mathematics, and information and computer technology to collate, summarize, and display data and to explore relationships between variables, especially those representing input and output.
• MS-ETS1-6. Evaluate the strength of a conclusion that can be inferred from any data set, using appropriate grade-level mathematical and statistical techniques.
• MS-ETS1-7. Recognize patterns in data that suggest relationships worth investigating further. Distinguish between causal and correlational relationships.
• MS-ETS1.8. Collect data from physical models and analyze the performance of a design under a range of conditions.
● MS-D3P.2. Developing and Using Models. Makes use of models and simulations to analyze existing systems so as to see where flaws might occur or to test possible solutions to a new problem and calls on models of various sorts to test proposed systems.

HAWAII CORE STANDARDS FOR SOCIAL STUDIES (HCSSS)

● D1.5.6-8. DETERMINE THE KINDS OF SOURCES THAT WILL BE HELPFUL IN ANSWERING COMPELLING AND SUPPORTING QUESTIONS, TAKING INTO CONSIDERATION MULTIPLE POINTS OF VIEWS REPRESENTED IN THE SOURCES .
● D1.3.9-12. EXPLAIN POINTS OF AGREEMENT AND DISAGREEMENT EXPERTS HAVE ABOUT INTERPRETATIONS AND APPLICATIONS OF DISCIPLINARY CONCEPTS AND IDEAS ASSOCIATED WITH A SUPPORTING QUESTION.
● D2.CIV.7.6-8. APPLY CIVIC VIRTUES AND DEMOCRATIC PRINCIPLES IN SCHOOL AND COMMUNITY SETTINGS .
● D2.ECO.2.6-8. EVALUATE ALTERNATIVE APPROACHES OR SOLUTIONS TO CURRENT ECONOMIC ISSUES IN TERMS OF BENEFITS AND COSTS FOR DIFFERENT GROUPS AND SOCIETY AS A WHOLE.
● D2.GEO.1.6-8. CONSTRUCT MAPS TO REPRESENT AND EXPLAIN THE SPATIAL PATTERNS OF CULTURAL AND ENVIRONMENTAL CHARACTERISTICS.
● D2.GEO.2.6-8. USE MAPS, SATELLITE IMAGES, PHOTOGRAPHS, AND OTHER REPRESENTATIONS TO EXPLAIN RELATIONSHIPS BETWEEN THE LOCATIONS OF PLACES AND REGIONS, AND CHANGES IN THEIR ENVIRONMENTAL CHARACTERISTICS.
● D2.GEO.4.6-8. EXPLAIN HOW CULTURAL PATTERNS AND ECONOMIC DECISIONS INFLUENCE ENVIRONMENTS AND THE DAILY LIVES OF PEOPLE IN BOTH NEARBY AND DISTANT PLACES.
● D3.3.6-8. IDENTIFY EVIDENCE THAT DRAWS INFORMATION FROM MULTIPLE SOURCES TO SUPPORT CLAIMS , NOTING EVIDENTIARY LIMITATIONS.
● D4.1.6-8. CONSTRUCT ARGUMENTS USING CLAIMS AND EVIDENCE FROM MULTIPLE SOURCES , WHILE ACKNOWLEDGING THE STRENGTHS AND LIMITATIONS OF THE ARGUMENTS.
● D4.2.6-8. CONSTRUCT EXPLANATIONS USING REASONING, CORRECT SEQUENCE, EXAMPLES, AND DETAILS WITH RELEVANT INFORMATION AND DATA, WHILE ACKNOWLEDGING THE STRENGTHS AND WEAKNESSES OF THE EXPLANATIONS.
● D4.3.6-8. PRESENT ADAPTATIONS OF ARGUMENTS AND EXPLANATIONS ON TOPICS OF INTEREST TO OTHERS TO REACH AUDIENCES AND VENUES OUTSIDE THE CLASSROOM USING PRINT AND ORAL TECHNOLOGIES (E.G., POSTERS, ESSAYS, LETTERS, DEBATES, SPEECHES, REPORTS, AND MAPS) AND DIGITAL TECHNOLOGIES (E.G., INTERNET, SOCIAL MEDIA, AND DIGITAL DOCUMENTARY.)
● D4.7.6-8. ASSESS THEIR INDIVIDUAL AND COLLECTIVE CAPACITIES TO TAKE ACTION TO ADDRESS LOCAL , REGIONAL, AND GLOBAL PROBLEMS, TAKING INTO ACCOUNT A RANGE OF POSSIBLE LEVERS OF POWER, STRATEGIES, AND POTENTIAL OUTCOMES.
● D4.8.6-8. APPLY A RANGE OF DELIBERATIVE AND DEMOCRATIC PROCEDURES TO MAKE DECISIONS AND TAKE ACTION IN THEIR CLASSROOMS AND SCHOOLS, AND IN OUT-OF-SCHOOL CIVIC CONTEXTS.

HAWAII COMMON CORE ENGLISH LANGUAGE ARTS

● CCSS.ELA-LITERACY.RI.7.8 TRACE AND EVALUATE THE ARGUMENT AND SPECIFIC CLAIMS IN A TEXT, ASSESSING WHETHER THE REASONING IS SOUND AND THE EVIDENCE IS RELEVANT AND SUFFICIENT TO SUPPORT THE CLAIMS.
● CCSS.ELA-LITERACY.SL.7.4 PRESENT CLAIMS AND FINDINGS, EMPHASIZING SALIENT POINTS IN A FOCUSED, COHERENT MANNER WITH PERTINENT DESCRIPTIONS, FACTS, DETAILS, AND EXAMPLES; USE APPROPRIATE EYE CONTACT, ADEQUATE VOLUME, AND CLEAR PRONUNCIATION.

	● CCSS.ELA-LITERACY.SL.7.5 INCLUDE MULTIMEDIA COMPONENTS AND VISUAL DISPLAYS IN PRESENTATIONS TO CLARIFY CLAIMS AND FINDINGS AND EMPHASIZE SALIENT POINTS. ● CCSS.ELA-LITERACY.L.7.2 DEMONSTRATE COMMAND OF THE CONVENTIONS OF STANDARD ENGLISH CAPITALIZATION, PUNCTUATION, AND SPELLING WHEN WRITING. ● CCSS.ELA-LITERACY.L.7.6 ACQUIRE AND USE ACCURATELY GRADE-APPROPRIATE GENERAL ACADEMIC AND DOMAIN SPECIFIC WORDS AND PHRASES; GATHER VOCABULARY KNOWLEDGE WHEN CONSIDERING A WORD OR PHRASE IMPORTANT TO COMPREHENSION OR EXPRESSION. ● CCSS.ELA-LITERACY.RST.6-8.1 CITE SPECIFIC TEXTUAL EVIDENCE TO SUPPORT ANALYSIS OF SCIENCE AND TECHNICAL TEXTS. ● CCSS.ELA-LITERACY.RST.6-8.7 INTEGRATE QUANTITATIVE OR TECHNICAL INFORMATION EXPRESSED IN WORDS IN A TEXT WITH A VERSION OF THAT INFORMATION EXPRESSED VISUALLY (E.G., IN A FLOWCHART, DIAGRAM, MODEL, GRAPH, OR TABLE). ● CCSS.ELA-LITERACY.RST.6-8.10 BY THE END OF GRADE 8, READ AND COMPREHEND SCIENCE/TECHNICAL TEXTS IN THE GRADES 6-8 TEXT COMPLEXITY BAND INDEPENDENTLY AND PROFICIENTLY. ● CCSS.ELA-READINESS.Reading. 6-8.7 Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words. ● CCSS.ELA-READING. 6-8.10. Range of Reading and Level of Text Complexity 10. Read and comprehend complex literary and informational texts independently and proficiently ● CCSS.ELA-READING 6-8.1 INFORMATIONAL TEXT Cite the textual evidence that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text. ● CCSS.ELA-READING 6-8.10 INFORMATIONAL TEXT. Range of Reading and Level of Text Complexity. By the end of the year, read and comprehend literary nonfiction in the grades 6–8 text complexity band proficiently, with scaffolding as needed at the high end of the range. ● CCSS.ELA-LITERACY.WHST.6-8.1 WRITE ARGUMENTS FOCUSED ON DISCIPLINE-SPECIFIC CONTENT. ● CCSS.ELA-LITERACY.WHST.6-8.2 WRITE INFORMATIVE/EXPLANATORY TEXTS, INCLUDING THE NARRATION OF HISTORICAL EVENTS, SCIENTIFIC PROCEDURES/EXPERIMENTS, OR TECHNICAL PROCESSES. ● CCSS.ELA-LITERACY.WHST.6-8.4 PRODUCE CLEAR AND COHERENT WRITING IN WHICH THE DEVELOPMENT, ORGANIZATION, AND STYLE ARE APPROPRIATE TO TASK, PURPOSE, AND AUDIENCE. ● CCSS.ELA-LITERACY.WHST.6-8.5 WITH SOME GUIDANCE AND SUPPORT FROM PEERS AND ADULTS, DEVELOP AND STRENGTHEN WRITING AS NEEDED BY PLANNING, REVISING, EDITING, REWRITING, OR TRYING A NEW APPROACH, FOCUSING ON HOW WELL PURPOSE AND AUDIENCE HAVE BEEN ADDRESSED. ● CCSS.ELA-LITERACY.WHST.6-8.6 USE TECHNOLOGY, INCLUDING THE INTERNET, TO PRODUCE AND PUBLISH WRITING AND PRESENT THE RELATIONSHIPS BETWEEN INFORMATION AND IDEAS CLEARLY AND EFFICIENTLY. ● CCSS.ELA-LITERACY.WHST.6-8.7 CONDUCT SHORT RESEARCH PROJECTS TO ANSWER A QUESTION (INCLUDING A SELF-GENERATED QUESTION), DRAWING ON SEVERAL SOURCES AND GENERATING ADDITIONAL RELATED, FOCUSED QUESTIONS THAT ALLOW FOR MULTIPLE AVENUES OF EXPLORATION. ● CCSS.ELA-LITERACY.WHST.6-8.8 GATHER RELEVANT INFORMATION FROM MULTIPLE PRINT AND DIGITAL SOURCES, USING SEARCH TERMS EFFECTIVELY; ASSESS THE CREDIBILITY AND ACCURACY OF EACH SOURCE; AND QUOTE OR PARAPHRASE THE DATA AND CONCLUSIONS OF OTHERS WHILE AVOIDING PLAGIARISM AND FOLLOWING A STANDARD FORMAT FOR CITATION. ● CCSS.ELA-LITERACY.WHST.6-8.9 DRAW EVIDENCE FROM INFORMATIONAL TEXTS TO SUPPORT ANALYSIS, REFLECTION, AND RESEARCH. ● CCSS.ELA-LITERACY.WHST.6-8.10 WRITE ROUTINELY OVER EXTENDED TIME FRAMES (TIME FOR REFLECTION AND REVISION) AND SHORTER TIME FRAMES (A SINGLE SITTING OR A DAY OR TWO) FOR A RANGE OF DISCIPLINE-SPECIFIC TASKS, PURPOSES, AND AUDIENCES. **SUPPORTING STANDARDS** **HAWAII COMMON CORE MATH** ● CCSS.MATH.CONTENT.8.SP.A.2 KNOW THAT STRAIGHT LINES ARE WIDELY USED TO MODEL RELATIONSHIPS BETWEEN TWO QUANTITATIVE VARIABLES. FOR SCATTER PLOTS THAT SUGGEST A LINEAR ASSOCIATION, INFORMALLY FIT A STRAIGHT LINE, AND INFORMALLY ASSESS THE MODEL FIT BY JUDGING THE CLOSENESS OF THE DATA POINTS TO THE LINE. ● CCSS.MATH.CONTENT.7.EE.B.3 SOLVE MULTI-STEP REAL-LIFE AND MATHEMATICAL PROBLEMS POSED WITH POSITIVE AND NEGATIVE RATIONAL NUMBERS IN ANY FORM (WHOLE NUMBERS, FRACTIONS, AND DECIMALS), USING TOOLS STRATEGICALLY. APPLY PROPERTIES OF OPERATIONS TO CALCULATE WITH NUMBERS IN ANY FORM; CONVERT BETWEEN FORMS AS APPROPRIATE; AND ASSESS THE REASONABLENESS OF ANSWERS USING

MENTAL COMPUTATION AND ESTIMATION STRATEGIES.
● CCSS.MATH.CONTENT.8.F.A.4 CONSTRUCT A FUNCTION TO MODEL A LINEAR RELATIONSHIP BETWEEN TWO QUANTITIES.
● DETERMINE THE RATE OF CHANGE AND INITIAL VALUE OF THE FUNCTION FROM A DESCRIPTION OF A RELATIONSHIP OR FROM TWO (X, Y) VALUES, INCLUDING READING THESE FROM A TABLE OR FROM A GRAPH.
● INTERPRET THE RATE OF CHANGE AND INITIAL VALUE OF A LINEAR FUNCTION IN TERMS OF THE SITUATION IT MODELS, AND IN TERMS OF ITS GRAPH OR A TABLE OF VALUES.
● CCSS.MATH.CONTENT.8.F.A.5 DESCRIBE QUALITATIVELY THE FUNCTIONAL RELATIONSHIP BETWEEN TWO QUANTITIES BY ANALYZING A GRAPH (E.G., WHERE THE FUNCTION IS INCREASING OR DECREASING, LINEAR OR NONLINEAR). SKETCH A GRAPH THAT EXHIBITS THE QUALITATIVE FEATURES OF A FUNCTION THAT HAS BEEN DESCRIBED VERBALLY.

ARTS EDUCATION (NCAS)

● MA:RE7.1.KA RECOGNIZE AND SHARE COMPONENTS AND MESSAGES IN MEDIA ARTWORKS.
● MA:CN10.1.1A USE PERSONAL EXPERIENCES, INTERESTS, AND MODELS IN CREATING MEDIA ARTWORKS.
● MA:CN10.1.7A ACCESS, EVALUATE AND USE INTERNAL AND EXTERNAL RESOURCES TO INFORM THE CREATION OF MEDIA ARTWORKS, SUCH AS EXPERIENCES, INTERESTS, RESEARCH, AND EXEMPLARY WORKS.
● MA:CN11.1.7B ANALYZE AND RESPONSIBLY INTERACT WITH MEDIA ARTS TOOLS AND ENVIRONMENTS , CONSIDERING COPYRIGHT, ETHICS, MEDIA LITERACY, AND SOCIAL MEDIA.
● VA:CR1.1.7A APPLY METHODS TO OVERCOME CREATIVE BLOCKS.
● VA:CR1.2.IIA CHOOSE FROM A RANGE OF MATERIALS AND METHODS OF TRADITIONAL AND CONTEMPORARY ARTISTIC PRACTICES TO PLAN WORKS OF ART AND DESIGN.
● VA:CR1.1.IIIA VISUALIZE AND HYPOTHESIZE TO GENERATE PLANS FOR IDEAS AND DIRECTIONS FOR CREATING ART AND DESIGN THAT CAN AFFECT SOCIAL CHANGE.
● VA:CR2.3.KA CREATE ART THAT REPRESENTS NATURAL AND CONSTRUCTED ENVIRONMENTS.
● VA:CR2.3.3A INDIVIDUALLY OR COLLABORATIVELY CONSTRUCT REPRESENTATIONS, DIAGRAMS, OR MAPS OF PLACES THAT ARE PART OF EVERYDAY LIFE.
● VA:CR2.3.4A DOCUMENT, DESCRIBE, AND REPRESENT REGIONAL CONSTRUCTED ENVIRONMENTS.
● VA:CR2.3.5A IDENTIFY, DESCRIBE, AND VISUALLY DOCUMENT PLACES AND/OR OBJECTS OF PERSONAL SIGNIFICANCE.
● VA:CR2.3.8A SELECT, ORGANIZE, AND DESIGN IMAGES AND WORDS TO MAKE VISUALLY CLEAR AND COMPELLING PRESENTATIONS.
● VA:RE7.2.KA DESCRIBE WHAT AN IMAGE REPRESENTS.
● VA:CN10.1.KA CREATE ART THAT TELLS A STORY ABOUT A LIFE EXPERIENCE.
● VA:CN10.1.2A CREATE WORKS OF ART ABOUT EVENTS IN HOME, SCHOOL, OR COMMUNITY LIFE.

HEALTH EDUCATION (NHES)

● 1.8.3 ANALYZE HOW THE ENVIRONMENT AFFECTS PERSONAL HEALTH.
● 1.12.3 ANALYZE HOW ENVIRONMENT AND PERSONAL HEALTH ARE INTERRELATED.
● 2.8.2 DESCRIBE THE INFLUENCE OF CULTURE ON HEALTH BELIEFS, PRACTICES, AND BEHAVIORS.

HAWAIʻI WORLD-READINESS STANDARDS FOR LEARNING LANGUAGES (ACTFL)

● 5.1 SCHOOL AND GLOBAL COMMUNITIES: LEARNERS USE THE LANGUAGE BOTH WITHIN AND BEYOND THE CLASSROOM TO INTERACT AND COLLABORATE IN THEIR COMMUNITY AND THE GLOBALIZED WORLD.
● 1.3 PRESENTATIONAL COMMUNICATION: LEARNERS PRESENT INFORMATION, CONCEPTS, AND IDEAS TO INFORM, EXPLAIN, PERSUADE, AND NARRATE ON A VARIETY OF TOPICS USING APPROPRIATE MEDIA AND ADAPTING TO VARIOUS AUDIENCES OF LISTENERS, READERS, OR VIEWERS.
● 3.1 MAKING CONNECTIONS: LEARNERS BUILD, REINFORCE, AND EXPAND THEIR KNOWLEDGE OF OTHER DISCIPLINES WHILE USING THE LANGUAGE TO DEVELOP CRITICAL THINKING AND TO SOLVE PROBLEMS CREATIVELY.

Types of Activities	• **Engage :** Introduces students to the unit / topic and excites them about it. Initially demonstrates how to use tools and introduces vocabulary words • **Explore** : Students collect data and manipulate it to understand concepts • **Investigate :** Students use data to solve a problem and / or answer a question • **Explain :** Students describe data, their understanding of concepts, use vocabulary in new ways • **Inspire :** Student communicate their learning and understanding with a larger audience beyond the classroom
ESSENTIAL QUESTION(S)	• HOW HAVE HAWAII'S SHORELINES AND CORAL REEFS BEEN IMPACTED BY GLOBAL WARMING? • HOW DOES THE IMPACT FROM GLOBAL WARMING ON HAWAIIAN SHORELINES AND CORAL REEFS AFFECT LIFE IN HAWAII? • WHAT CAN PEOPLE DO TO HELP REDUCE THE IMPACT OF GLOBAL WARMING ON HAWAII'S SHORELINES AND CORAL REEFS? • WHAT ARE THE CAUSES OF GLOBAL WARMING?
LEARNING OUTCOMES	**STUDENTS WILL BE ABLE TO:** • IDENTIFY THE PATTERNS THAT REPRESENT THE CHANGES IN OCEAN CHARACTERISTICS AROUND HAWAII'S SHORELINES AND CORAL REEFS • IDENTIFY THE IMPORTANCE OF CORAL REEFS IN THE GLOBAL ENVIRONMENT. • INTERPRET DATA SETS, GRAPHS AND MAPS OF REAL-WORLD DATA RELATED TO OCEAN CHARACTERISTICS. • USE TECHNOLOGY TO SUPPORT THEIR IDEAS TO PROTECT OR REDUCE THE HUMAN IMPACT ON THE HAWAIIAN SHORELINES AND CORAL REEFS. • FIND WAYS TO COMMUNICATE THEIR LEARNING WITH THE PUBLIC AS A FORM OF A CALL TO ACTION TO PROTECT AND/OR REDUCE THE HUMAN IMPACT ON HAWAIIAN SHORELINES AND CORAL REEFS.
PRE-REQUISITES	**STUDENTS SHOULD HAVE:** • EXPERIENCE WITH SOME DATA COLLECTION, TABLE CREATION, & DATA ORGANIZATION • EXPERIENCE USING BASIC MEASURING TOOLS AND MICROSCOPES • GRADE LEVEL MATH, WRITING AND READING LEVELS

UNIT LESSON PLAN

ENGAGE

DAY 1:

180 MINUTES

MATERIALS

- WATER TESTING KITS
- SOIL TESTING KITS
- WATER TEMPERATURE PROBES
- ENDOSCOPES
- FIELD MICROSCOPES
- CHARTS OF NATIVE FISH
- CHARTS OF NATIVE SEAWEED
- CHARTS OF NATIVE PLANTS
- WORK GLOVES FOR ALL STUDENTS
- 3 - 4 BUCKETS FOR COLLECTING SAMPLES
- SMALL BOTTLES WITH CAPS FOR SAMPLE COLLECTION
- GOPRO OR OTHER UNDERWATER CAMERA
- TWEEZERS
- MAGNIFYING GLASSES
- SUNSCREEN, HATS, DRINKING WATER
- PENCILS/ PAPER AND/OR COMPUTERS
- GOGGLES
- TEMPERATURE PROBE (WATER PROOF)
- TURBIDITY TOOL
- SIEVE

STANDARDS:

- MS-LS2-2. CONSTRUCT AN EXPLANATION THAT PREDICTS PATTERNS OF INTERACTIONS AMONG ORGANISMS ACROSS MULTIPLE ECOSYSTEMS.
- MS-ETS1-2. EVALUATE COMPETING DESIGN SOLUTIONS USING A SYSTEMATIC PROCESS TO DETERMINE HOW WELL THEY MEET THE CRITERIA AND CONSTRAINTS OF THE PROBLEM.
- D2.ECO.2.6-8. EVALUATE ALTERNATIVE APPROACHES OR SOLUTIONS TO CURRENT ECONOMIC ISSUES IN TERMS OF BENEFITS AND COSTS FOR DIFFERENT GROUPS AND SOCIETY AS A WHOLE.
- D2.GEO.2.6-8. USE MAPS, SATELLITE IMAGES, PHOTOGRAPHS, AND OTHER REPRESENTATION TO EXPLAIN RELATIONSHIPS BETWEEN THE LOCATIONS OF PLACES AND REGIONS, AND CHANGES IN THEIR ENVIRONMENTAL CHARACTERISTICS.

DAY 1 (180 MINUTES)

Synopsis: To begin this unit, the first lesson will introduce the students by engaging them in a "*Field Study Experience*''. This involves visiting a specific location where students can *kilo* (observe) their natural world. Because the main purpose of this unit is grounded in the opportunity of the class to participate in the restoration of an ahupua'a, the Field Study Experience will be visiting a natural Hawaiian fishpond at a location where the restoration will physically take place, even though we anticipate that the actions will impact the whole of the ahupua'a system. Generally speaking, Field Study Experiences involve Kilo, an introduction to issues/problems related to the site, and opportunities for data collection, and inquiry development, as well as a service component. Therefore, these periods require more than a single class period. During the first day, students will be asking : **"What are the issues or problems with the site we are visiting today?"**

NOTE: Our students will meet at the Aina Hina shopping center for the field study day.

TEACHER DOES/ASKS	STUDENT DOES/ASKS
Arrange for an expert /mentor of the site for a field study, especially if the teacher is not familiar or knowledgeable of it. Local organizations serve great in this capacity.	Kilo the environment without any prior direct instruction or information from the teacher or mentor / expert. Takes notes / draws observations. Students share out to the whole class 1 observation/thought / feeling about the site.
Discuss the history of the ahupua'a including the blocking of the lava tube, and the plans to open the tube (specific to our location). Other classes could discuss what an ahupua'a is and visit a fishpond or a stream along an ahupua'a in Hawaii.	(Specific to our class) Students discuss what impacts the construction may have had and may continue to have on the environment and on the living organisms within the ahupua'a all the way from the mountains to the fishpond and to the currently non-existent coral reef. (For other classes) Students might discuss what impacts housing or construction around the area, or farming practices etc., may have had on the structure of the ahupua;a that they are visiting.
Direct students to answer the question in the worksheet, create a map of the location to indicate where they are collecting data, create a data table for the specific data that they are assigned to collect, and to gather the necessary tools that they will need to collect samples,	Students work together to create a map of the location. Then mark the map to indicate where they are collecting samples for data collection.

● D2.GEO.4.6-8. EXPLAIN HOW CULTURAL PATTERNS AND ECONOMIC DECISIONS INFLUENCE ENVIRONMENTS AND THE DAILY LIVES OF PEOPLE IN BOTH NEARBY AND DISTANT PLACES. ● CCSS.ELA-LITERACY. L.7.2 DEMONSTRATE COMMAND OF THE CONVENTIONS OF STANDARD ENGLISH CAPITALIZATION, PUNCTUATION, AND SPELLING WHEN WRITING. ●CSS.ELA-LITERACY.L.7.6 ACQUIRE AND USE ACCURATELY GRADE-APPROPRIATE GENERAL ACADEMIC AND DOMAIN SPECIFIC WORDS AND PHRASES; GATHER VOCABULARY KNOWLEDGE WHEN CONSIDERING A WORD OR PHRASE IMPORTANT TO COMPREHENSION OR EXPRESSION *INQUIRY STANDARD SS. 6-8.5.1 IDENTIFY LOCAL, REGIONAL AND OR GLOBAL PROBLEMS OR ISSUES USING INTERDISCIPLINARY LENSES	and measure the samples. Break students up into small groups of 3. Make sure students know how to use the test kits properly as well as the measuring tools, and that they have a means of documenting and recording the results from the test kits/measuring tools. **The teacher creates a field study schedule in which the students sign up to visit at least once during the unit to collect data that is added to a data set managed by the teacher and housed in a google drive that all of the students have access to.** Assign homework on NOAA eBook website: https://www.noaa.gov/climate-resilience-in-your-island-community-activity-ebook Assign students to complete the worksheet : **No Ka ʻĀina Aloha**	Students use various tools and kits to explore the mini habitats in the site environment. (i.e.: soil kit with tweezers, goggles & test tubes; water kit with goggles and test tubes; temperature probe and turbidity tool; field microscope with tweezers; endoscope with fish identifier tool; native plant identifier tool and field microscope; native seaweed (limu) identifier tool sieve and field microscope; and GoPro; etc.) buckets for sample collection, and wear gloves to collect and analyze samples from the various mini habitats within the site. **Students sign up to return to the field site at least once during the unit to collect data and add it to the class data tables that the teacher manages. All data is housed in a google folder that students have access to.** Click on the links on the left hand side of the eBook titled “Exploring Indigenous Knowledge in Hawaii” and “Climate Resilient Island Community Tour”. Complete the sections by following the directions. Complete the No Ka ʻĀina Aloha worksheet.

EXPLORE

DAY 2:

60 MINUTES

MATERIALS

- Student computers
- Teacher computer
- Overhead projector
-wifi/internet connection
- Paper
- Pens
- Crayons

STANDARDS:

- CSS.ELA-LITERACY.SL.7.5 Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.
- MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
- D2.Geo.1.6-8. Construct maps to represent and explain the spatial patterns of cultural and environmental characteristics.
- D2.Geo.2.6-8. Use maps, satellite images, photographs, and other representations to explain relationships between the locations of places and regions, and changes in their environmental characteristics.
- MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.
- CCSS.ELA-LITERACY.L.7.2 Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.
- CSS.ELA-LITERACY.L. 7.6 Acquire and use accurately grade-appropriate general academic and domain specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.
- CSS.ELA-LITERACY.RST. 6-8.10 By the end of grade 8, read and comprehend science/technical texts in the grades 6-8 text complexity band independently and proficiently.

DAY 2 (60 MINUTES)

Synopsis: In this lesson students will use technology to examine historical and current data of ocean characteristics around the Hawaiian island in mapping and graphical forms. The purpose is to help them identify changes in the shoreline over periods of time including days, weeks, months and years, looking for patterns. It is expected that students will find a variety of ways to explain the patterns that they observe in the data including those related to global warming, and seasonal changes. Students will be able to answer: "**How can we explain the patterns we see in the changes of our shorelines over time?"**

Teacher Does/Asks	**Student Does/ Asks**
Teacher provides this link to the AquaLink website. This website uses historical and current data to map and graph ocean related measurements such as water temperature, wave heights, wind speeds, etc. The teacher will provide students with directions to use the tool and may show students how to observe their location over different periods of time to see the changes of the shoreline (Note: not all beaches have been added to this database yet).	Individually, students will use the Aqualink to learn about the changes in the shoreline in Hawaii. They will explore Hanauma Bay with the teacher and then they will find a specific beach of their choice in Hawaii by typing the beach name into the search bar. They will investigate the history of the climate in terms of water height, wind speed, water temperature, etc. in the past and current conditions. Using the tool, students will explore the seafloor and coral reefs around their favorite locations. They create drawings, graphs, maps, storyboards and/or data tables to best describe the ocean characteristics over time.
Teacher facilitates a whole class discussion of a comparison of Hawaiian shorelines and time periods that students observed using the Aqualink tool. Teacher asks students to notice patterns over days, weeks, months and years, and asks students to try to explain the patterns they see in the data.	Students share their representations of Hanauma Bay shoreline and of their favorite Hawaii shoreline location over time. They discuss the similarities and differences from one shoreline to the next and from one period of time to the next. Students engage in a whole class discussion, addressing the teacher's questions, using their experience and observations from Aqualink.
Teacher assigns critical thinking questions and a short essay question related to the Aqualink activity. Teacher asks "What are the characteristics of climate related to shoreline and the ocean?" Teacher asks "What was similar/different from one location to the next from one time period to the next?"	Students answer questions, write an essay and provide peer review on their essays about global warming and its impact on Hawaii's shorelines and oceans.

INVESTIGATE

DAY 3 & 4:

60 MINUTES EACH

MATERIALS

- Student computers
- Teacher computer
- Overhead projector
-wifi/internet connection

STANDARDS:

- MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.
- MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
- MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services
- MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- D1.5.6-8. Determine the kinds of sources that will be helpful in answering compelling and supporting questions, taking into consideration multiple points of views represented in the sources
- D2.Eco.2.6-8. Evaluate alternative approaches or solutions to current economic issues in terms of benefits and costs for different groups and society as a whole.
- D2.Geo.4.6-8. Explain how cultural patterns and economic decisions influence environments and the daily lives of people in both nearby and distant places.
- D3.3.6-8. Identify evidence that draws information from multiple sources to support claims , noting evidentiary limitations.
- D4.1.6-8. Construct arguments using claims and evidence from multiple sources , while acknowledging the strengths and limitations of the arguments
- D4.7.6-8. Assess their individual and collective capacities to take action to address local , regional, and global problems, taking into account a range of possible levers of power, strategies, and potential outcomes.
- CCSS.ELA-LITERACY. L.7.2 Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.
- CCSS.ELA-LITERACY. L.7.6Acquire and use accurately grade- appropriate general academic and domain specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or

DAY 3 & 4 (60 MINUTES EACH)

Synopsis: During Day 3, the students will use another technology tool that maps the coastline of Hawaii in order to see how the ocean has changed over time and allows the user to evaluate the impact that global warming may have on life in Hawaii. They will also review articles and sites that provide information about the shorelines in Hawai'i using real data, and they will engage in their own internet research to answer a question. While examining the impact of global warming on shorelines, students will also examine the coral reefs surrounding the Hawaiian islands, focusing on the health and changes over time. Students will discuss and consider the role that coral reefs play in the health and cultural practices of Hawaiian life. In other words, **Why do we care if the coral reefs die or not?**

Teacher Does/Asks	Student Does/Asks
Teacher gives this link to the PacIOOS Voyager website (an interactive ocean data portal) to the students, and directs the students to use this worksheet to follow the directions to use the website. In the worksheet there are other links to the DLNR, NOAA and EPA websites where students will examine graphical models from real data representing current and future shoreline, weather and climate characteristics in Hawai'i. In addition the teacher will direct them to engage in a short research action, to address the question "Why do we care if the coral reefs die or not?" The teacher will have the students work individually on the worksheet and share their answers in small groups of 3-4 to answer some of the questions on the worksheet. This can be done by either having the students work in the same static peer group or by having students work in rotating small groups so that they always have new voices and ideas to share with their own. The teacher should pull up a graphical representation and ask the students if they understand what it is representing. Have them explain it outloud to each other and if they can't, then the teacher should explain it. Also, the teacher should open a shape file and an ArcGis file and have the students try to explain what they are looking	Students start with this worksheet and follow the directions to get onto and use the PacIOOs Voyager website. All of the directions and questions are written in the worksheet for the students to follow. The students work both individually and in small groups to complete the worksheet as they conduct their research and answer their questions. These are teacher directed questions. Although this could be completed in one day (with components as homework), it is suggested that the teacher provide two days to allow the students time to really review the information in the sites deeply.

expression. ● CCSS.ELA-LITERACY. RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. ● CCSS.ELA-LITERACY. RST.6-8.10 By the end of grade 8, read and comprehend science/ technical texts in the grades 6-8 text complexity band independently and proficiently. ● CCSS.ELA-CC READINESS. 6-8.7 Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words. ● CCSS.ELA-LITERACY. WHST.6-8.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. ● CCSS.ELA-LITERACY. WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. ● CCSS.ELA-LITERACY. WHST.6-8.8 Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. ● VA:Cr2.3.3a Individually or collaboratively construct representations, diagrams, or maps of places that are part of everyday life. ● VA:Cr2.3.4a Document, describe, and represent regional constructed environments. ● VA:Cr2.3.5a Identify, describe, and visually document places and/or objects of personal significance. ● VA:Re7.2.Ka Describe what an image represents. ● 1.8.3 Analyze how the environment affects personal health. ● 1.12.3 Analyze how environment and personal health are interrelated.		

at. Again, if they struggle, the teacher should provide support by describing the images and explaining how the data is being used in the images. Also, make sure to describe any limitations in the data or in the images.	

INVESTIGATE

DAY 5:

60 MINUTES

MATERIALS

- **Student computers**
- **wifi/internet connection**
- **An Inconvenient Truth (2006) Video**
- **Al Gore's Inconvenient Truth Worksheet**

STANDARDS:

● MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

●MS-LS2.A1:
Interdependent Relationships in Ecosystems. Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors.

● D1.3.9-12. Explain points of agreement and disagreement experts have about interpretations and applications of disciplinary concepts and ideas associated with a supporting question.

● D3.3.6-8. Identify evidence that draws information from multiple sources to support claims , noting evidentiary limitations.

● D4.1.6-8. Construct arguments using claims and evidence from multiple sources , while acknowledging the strengths and limitations of the arguments.

● D4.2.6-8. Construct explanations using reasoning, correct sequence, examples, and details with relevant information and data, while acknowledging the strengths and weaknesses of the explanations.

● CCSS.ELA- LITERACY. RI.7.8 Trace and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient to support the claims.

● CCSS.ELA-READINESS.
Reading. 6-8.7 Integrate and evaluate content presented in diverse formats and media,
including visually and quantitatively, as well as in words.

● D4.8.6-8. Apply a range of deliberative and democratic procedures to make decisions and take action in their classrooms and schools, and in out-of-school civic contexts.

Day 5 (60 minutes)

Synopsis: This is an opportunity for students to deepen their learning about the health and value of a coral reef in Hawai'i as they conduct research in small groups. The goal of this activity is to have students recognize the diversity of life within the coral reef and the importance of protecting that diversity. They will also evaluate the interrelationships of the living organisms in an ecosystem on the survivability of an organism. Students will draw a before and after picture of a coral reef and they will use research to support their drawings. The main question they are focusing on is **"What is a healthy coral reef and how does climate change impact the life of a coral reef system?"**

Teacher Does/Asks	Student Does/Asks
Hand out the large drawing paper and colored marker/pencils to students and organize them into small groups. Ask students to **draw 3 different healthy species of coral in an ocean** on their paper. Let them know that ultimately they are going to draw a coral reef ecosystem and this is just the start of their drawing. Allow students to use other resources such as text books and the internet to find images to help them with their drawings. Remind students that they should be looking for not only images, but details as well. For example, they should know what kind of environmental conditions are needed for their specific species. They should know how big they grow, how fast they grow, what they eat, what their life cycle is, what consumes them, etc. **Students must cite their sources on the back of their drawings** in **APA format** and indicate the source in their drawing using **Chicago Style in-text referencing**. The teacher may "read off" the directions to the whole class, 1 step at a time, to help manage time,	Students work in small groups of 3-4 to research 3 different species of coral and to draw them in an ocean. They use this worksheet to help them in drawing their group poster. After drawing their group poster, the small groups share with the whole class what they drew including the key they created and the foodweb they identified within their ecosystem. Students take turns discussing what they believe are issues and/or concerns for the health/survivability of their coral reef ecosystem based on the environmental conditions, the diversity, and the interactions of living organisms in their coral reef ecosystems. Students individually write an essay describing and explaining the issues and concerns related to the health and survivability of their ecosystem. Questions/prompts are provided to guide them in writing their essays. A rubric for their drawing and their essays is also included.

	or may hand out this worksheet to allow students to guide themselves in completing the activity. The teacher facilitates the discussions after the drawings are completed and prior to the writing of the essays.	**The individual essays may be a homework assignment.**

EXPLAIN

DAY 6:

60 MINUTES

MATERIALS

- Student computers
- Teacher computer
- Overhead projector
-wifi/internet connection
- large poster paper
- colored markers/ crayons/pencils
- tape or tacks to hang posters

STANDARDS:

- CCSS.ELA-
READING READINESS 6-8.7 Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words.
- CCSS.ELA- READING
READINESS. Range of Reading and Level of Text Complexity 6-8.10. Read and comprehend complex literary and informational texts independently and proficiently
- CCSS.ELA-READING
6-8.1 INFORMATIONAL TEXT Cite the textual evidence that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.
- CCSS.ELA-READING
6-8.10 INFORMATIONAL TEXT. Range of Reading and Level of Text Complexity. By the end of the year, read and comprehend literary nonfiction in the grades 6–8 text complexity band proficiently, with scaffolding as needed at the high end of the range.
- MS-LS2-1. Analyze and
interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
- MS-LS2-1.2. Integrate
quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
- MS-LS2.A1:
Interdependent Relationships in Ecosystems. Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors.

Day 6 (60 Minutes)

Synopsis: The activity includes a video lesson in which the students will learn about the claims made that support the argument for global warming. The movie is presented by previous Vice President Al Gore, made in 2006, titled "**An Inconvenient Truth**". The emphasis of this lesson is to have students identify the claims, and the evidence that support the argument for global warming, and to learn about the role that humans may have in climate change. The questions students will be asking are "**How do we know the climate is changing and what are the causes of global warming?**"

Teacher Does/Asks	Student Does/Asks
Teacher plays the movie, "**An Inconvenient Truth**" (2006), presented by previous Vice President Al Gore. These can be requested free on DVDs or they can be watched for free on iMDB.com The Teacher hands out this document for the students to complete prior to watching the movie, as they watch the movie, and after they watch the movie. **Suggestion:** The movie is approximately 1.5 hours long. Rather than watching the whole movie, which can be quite depressing, watching 40 minutes and allowing the students time to discuss the movie and solutions to the concerns in the movie will help reduce some of the anxiety that students might build while watching it. Ask students to share their responses to PART IV in the worksheet.	Students complete this worksheet with questions prior to watching the movie (PART I). Then in PART II and PART III they complete as they are watching the movie. PART IV is completed after watching the movie, and while they are conducting research. Students share their responses to PART IV.

- MS-LS2.A2:

Interdependent Relationships in Ecosystems.In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction.

- MS-LS2A3.

Interdependent Relationships in Ecosystems. Growth of organisms and population increases are limited by access to resources.

- MA:Cn10.1.1a Use personal experiences, interests, and models in creating media artworks.
- MA:Cn10.1.7a Access, evaluate and use internal and external resources to inform the creation of media artworks, such as experiences, interests, research, and exemplary works.
- MA:Cn11.1.7b Analyze and responsibly interact with media arts tools and environments , considering copyright, ethics, media literacy, and social media.
- VA:Cr2.3.Ka Create art that represents natural and constructed environments.
- VA:Cr2.3.3a Individually or collaboratively construct representations, diagrams, or maps of places that are part of everyday life.
- VA:Cr2.3.4a Document, describe, and represent regional constructed environments.
- VA:Cn10.1.2a Create works of art about events in home, school, or community life.
- D4.2.6-8. Construct explanations using reasoning, correct sequence, examples, and details with relevant information and data, while acknowledging the strengths and weaknesses of the explanations.

EXPLORE

DAY 7:

60 MINUTES

MATERIALS

Student computers
- Teacher computer
- Overhead projector
-wifi/internet connection

STANDARDS:

- MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
- MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
- MS-LS2-1.2. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
- MS-LS2.A1: Interdependent Relationships in Ecosystems. Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors.
- MS-LS2.A2: Interdependent Relationships in Ecosystems.In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction.
- MS-LS2A3. Interdependent Relationships in Ecosystems. Growth of organisms and population increases are limited by access to resources.
- MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.
- MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.
- D2.Eco.2.6-8. Evaluate alternative approaches or solutions to current economic issues in terms of benefits and costs for different groups and society as a whole.
- D2.Geo.4.6-8. Explain how cultural patterns and economic decisions influence environments and the daily lives of people in both nearby and distant places.

DAY 7 (60 MINUTES)

Synopsis: Using a simulation, students will explore the main gasses that make up our air. They will consider how our average global temperatures have been affected over time by greenhouse gasses, cloud cover and albedo, and they will consider both anthropogenic (human caused) and non-anthropogenic (non-human caused) global warming events. Students learn how solar radiation from the sun warms the Earth, and how greenhouse gasses impact that energy cycle. They then examine how humans contribute to the greenhouse effect by choosing human activities to investigate with an interactive model. The question the students will be asking today is "**Is global warming anthropogenic?"**

Teacher Does/Asks	Student Does/Asks
The teacher will set up a class in the WISE website in advance (registration is free). The teacher should choose the activity titled **"Global Climate Change & Urban Heat Islands"** and use this document to help set up their class. Decide whether you want students to work in small groups of 2-3 to discuss their ideas online or if you prefer that they answer the questions individually. Let them know either way so that they aren't confused by the prompts. Provide the students with the access code so that they can register for the WISE interactive lab. You will be able to access usernames and change passwords if students forget/lose them. Remind the students to scroll down to the bottom of each page and to click on the **Submit** button. It will highlight blue when they have filled in something in each response box.	Students will access the WISE website and will use this document to complete a lab using a simulation to explore the concept of global warming. They will read different perspectives, manipulate simple models, consider various real scenarios and reflect on their own ideas about what they are learning related to global warming, holes in the ozone layer, climate change and social justice based on the inequities that exist related to these concepts. Students may work individually as they review the various perspectives, or they may work in small groups of 2-3, by participating in an online conversation, as they learn to develop their own argument and structure their own evidential support for their argument.

● D4.1.6-8. Construct arguments using claims and evidence from multiple sources , while acknowledging the strengths and limitations of the arguments. ● D4.2.6-8. Construct explanations using reasoning, correct sequence, examples, and details with relevant information and data, while acknowledging the strengths and weaknesses of the explanations. ● CCSS.ELA-LITERACY. RI.7.8 Trace and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient to support the claims. ● CCSS.ELA-LITERACY. SL.7.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation. ● CCSS.ELA-LITERACY .L.7.2 Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing. ● CCSS.ELA-LITERACY. L.7.6 Acquire and use accurately grade-appropriate general academic and domain specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.	

EXPLORE

DAY 8:

60 MINUTES

MATERIALS

Student computers
- Teacher computer
- Overhead projector
-wifi/internet connection

STANDARDS:

- MS-LS2-1.C Cause and effect relationships may be used to predict phenomena in natural or designed systems.
- MS-LS2-1.2. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
- MS-D3P.5A. Using Mathematics and Computational Thinking. Using mathematics as tools for representing physical variables and their relationships, including constructing simulations, statistically analyzing data, and recognizing, expressing, and applying quantitative relationships.
- MS-D3P.5B. Mathematical and computational Thinking. Applies predictions of the behavior of physical systems, along with the testing of such predictions to statistically assess the significance of patterns or correlations.
- MS-ESS3-4. CONSTRUCT AN ARGUMENT SUPPORTED BY EVIDENCE FOR HOW INCREASES IN HUMAN POPULATION AND PER-CAPITA CONSUMPTION OF NATURAL RESOURCES IMPACT EARTH'S SYSTEMS.
- MS-ESS3-5. ASK QUESTIONS TO CLARIFY EVIDENCE OF THE FACTORS THAT HAVE CAUSED THE RISE IN GLOBAL TEMPERATURES OVER THE PAST CENTURY.
- MS- ETS 1-3. Analyze data systematically, either to look for salient patterns or to test whether data are consistent with an initial hypothesis.
- MS- ETS1-4. Recognize when data are in conflict with expectations and consider what revisions in the initial model are needed.
- MS-ETS1-5. Use spreadsheets, databases, tables, charts, graphs, statistics, mathematics, and information and computer technology to collate, summarize, and display data and to explore relationships between variables, especially those representing input and output.
- MS-ETS1-7. Recognize patterns in data that suggest relationships worth investigating further. Distinguish between causal and correlational relationships.
- MS-ETS1.8. Collect data from physical models and analyze the performance of a design under a range of conditions.

DAY 8 (60 MINUTES)

Synopsis: In this activity students delve deeper into learning about climate change. They scientifically explore the concept of climate change through simulations and models, and they discuss both the causes of anthropogenic and non-anthropogenic climate change impacts. Students work individually in the simulations and then discuss their observations and ideas in small groups. The question that students will ask today is "**How has climate changed over a period of time?"**

Teacher Does/Asks	Student Does/Asks
What questions do you have about climate change now that you have had some information about it? (Questions that have not been addressed yet and could be asked are): • Are there other causes besides humans that can lead to climate change? • What does carbon dioxide have to do with climate change? • How has the climate changed over time since before there were humans? • How many people does climate change impact? • What is being done to protect people from climate change? • What is the difference between the hole in the ozone layer and the greenhouse gasses? Teacher writes the questions the students have on a large white paper or on a board that won't get erased. Teacher adds these and other questions if the students don't think of them. The class will return to these questions at the end of class. Teacher provides the students with the PHeT instructions. There is no sign in or registration required for these simulations and all work is completed in the worksheet.	Students will start by writing questions that they may still have about climate change. Students share these questions in small groups. Students read aloud the definitions in the PHeT instructions to make sure everyone understands them before starting. Students will use the PHeT simulations individually following these instructions. Then after each section of the simulations, students share their observations and results in small groups to check their results. Those that have contradictory or differing results should return to the simulations to retry the manipulations and see if their observations were made correctly. There are 4 sets of simulations each should take about 10 - 15 minutes (Part III will take the longest time). The closing questions can be completed as homework. Students add questions to the class list of questions after they have completed the simulations. They identify questions that have been answered through the simulation activities and new questions that may

● MS-D3P.2. Developing and Using Models. Makes use of models and simulations to analyze existing systems so as to see where flaws might occur or to test possible solutions to a new problem and calls on models of various sorts to test proposed systems. ● CCSS.ELA-LITERACY.RST.6- 8 .7 INTEGRATE QUANTITATIVE OR TECHNICAL INFORMATION EXPRESSED IN WORDS IN A TEXT WITH A VERSION OF THAT INFORMATION EXPRESSED VISUALLY (E.G., IN A FLOWCHART, DIAGRAM, MODEL, GRAPH, OR TABLE). ● CCSS.MATH.CONTENT.8. SP.A.2 KNOW THAT STRAIGHT LINES ARE WIDELY USED TO MODEL RELATIONSHIPS BETWEEN TWO QUANTITATIVE VARIABLES. FOR SCATTER PLOTS THAT SUGGEST A LINEAR ASSOCIATION, INFORMALLY FIT A STRAIGHT LINE, AND INFORMALLY ASSESS THE MODEL FIT BY JUDGING THE CLOSENESS OF THE DATA POINTS TO THE LINE. ● CCSS.MATH.CONTENT.7. EE.B.3 SOLVE MULTI-STEP REAL-LIFE AND MATHEMATICAL PROBLEMS POSED WITH POSITIVE AND NEGATIVE RATIONAL NUMBERS IN ANY FORM (WHOLE NUMBERS, FRACTIONS, AND DECIMALS), USING TOOLS STRATEGICALLY. APPLY PROPERTIES OF OPERATIONS TO CALCULATE WITH NUMBERS IN ANY FORM; CONVERT BETWEEN FORMS AS APPROPRIATE; AND ASSESS THE REASONABLENESS OF ANSWERS USING MENTAL COMPUTATION AND ESTIMATION STRATEGIES. ● CCSS.MATH.CONTENT.8. F.A.4 CONSTRUCT A FUNCTION TO MODEL A LINEAR RELATIONSHIP BETWEEN TWO QUANTITIES. ● DETERMINE THE RATE OF CHANGE AND INITIAL VALUE OF THE FUNCTION FROM A DESCRIPTION OF A RELATIONSHIP OR FROM TWO (X, Y) VALUES, INCLUDING READING THESE FROM A TABLE OR FROM A GRAPH. ● INTERPRET THE RATE OF CHANGE AND INITIAL VALUE OF A LINEAR FUNCTION IN TERMS OF THE SITUATION IT MODELS, AND IN TERMS OF ITS GRAPH OR A TABLE OF VALUES. ● CCSS.MATH.CONTENT.8. F.A.5 DESCRIBE QUALITATIVELY THE FUNCTIONAL RELATIONSHIP BETWEEN TWO QUANTITIES BY ANALYZING A GRAPH (E.G., WHERE THE FUNCTION IS INCREASING OR DECREASING, LINEAR OR NONLINEAR). SKETCH A GRAPH THAT EXHIBITS THE QUALITATIVE FEATURES OF A FUNCTION THAT HAS BEEN DESCRIBED VERBALLY.		

Teacher returns to the questions students asked at the beginning of class and asks if they have any they would like to add to the list. The teacher then “cleans up” the questions, putting together similar questions and removing questions that were answered through the simulation. T**he teacher then has the students consider the questions and choose one from the list to dive deeper into as a research question.** This will become homework and part of their next assignment.	have been developed as a result of the simulations. **Students each choose a single question from the list to dive deeper into understanding by researching that specific question as homework. This will become part of the next assignment.**

INVESTIGATE/ EXPLAIN

DAY 9:

60 MINUTES

MATERIALS

Student computers
- Teacher computer
- Overhead projector
-wifi/internet connection
- construction paper
- colored markers, pencils, crayons
- scissors

STANDARDS (for Day 9 & 10)

- MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.
- 2.8.2 Describe the influence of culture on health beliefs, practices, and behaviors.
- MS-ETS1-5. Use spreadsheets, databases, tables, charts, graphs, statistics, mathematics, and information and computer technology to collate, summarize, and display data and to explore relationships between variables, especially those representing input and output.
- MS-ETS1-6. Evaluate the strength of a conclusion that can be inferred from any data set, using appropriate grade-level mathematical and statistical techniques.
- D1.5.6-8. Determine the kinds of sources that will be helpful in answering compelling and supporting questions, taking into consideration multiple points of views represented in the sources
- D1.3.9-12. Explain points of agreement and disagreement experts have about interpretations and applications of disciplinary concepts and ideas associated with a supporting question.
- D2.Eco.2.6-8. Evaluate alternative approaches or solutions to current economic issues in terms of benefits and costs for different groups and society as a whole.
- D2.Geo.4.6-8. Explain how cultural patterns and economic decisions influence environments and the daily lives of people in both nearby and distant places.
- D3.3.6-8. Identify evidence that draws information from multiple sources to support claims , noting evidentiary limitations.
- D4.1.6-8. Construct arguments using claims and evidence from multiple

DAY 9 (60 MINUTES)

SYNOPSIS: In this activity the students will learn what other countries are thinking and doing, socially and politically, about the concerns related to global warming. In addition they will return to a look at home, and see how global warming is impacting our Hawaiian shorelines using data driven information. Students will informally share what they have found about their research questions, so far, from the previous day. The question students will ask today is "**What solutions are there for developing sustainability against global warming in Hawaii?"**

Teacher Does/Asks	Student Does/Asks
The teacher starts the day by asking students to share in their small groups what they learned about their research questions from the previous day. The teacher asks the class if anyone feels their question needs to be revised or revisited. Are there any new questions that can be added to the list (It doesn't mean that the students asking have to be the ones researching the questions)? The teacher asks who found the most interesting information and the students share-out what they found. The teacher then breaks students into groups of 2 and gives each group 1 article/resource from the list to read/listen to. If the articles are less than 3 paragraphs the students should click on the links within and/or search for related keywords to learn more about the specific topics. The teacher directs the students to determine if the	Students take about 15 minutes to discuss what they learned about their research questions from the previous day. They write down notes that may support their own research from their peers' reporting. Students ask new questions to add to the class list. Students work in teams of 2, reading an article/resource or listening to a podcast related to global warming. Some of these are related to the topic in general and some are specific to Hawai'i. Some are about the problems or issues, some are about the solutions and some are both.

SOURCES , WHILE ACKNOWLEDGING THE STRENGTHS AND LIMITATIONS OF THE ARGUMENTS. ● D4.2.6-8. CONSTRUCT EXPLANATIONS USING REASONING, CORRECT SEQUENCE, EXAMPLES, AND DETAILS WITH RELEVANT INFORMATION AND DATA, WHILE ACKNOWLEDGING THE STRENGTHS AND WEAKNESSES OF THE EXPLANATIONS. ● CCSS.ELA-LITERACY.SL .7.4 PRESENT CLAIMS AND FINDINGS, EMPHASIZING SALIENT POINTS IN A FOCUSED, COHERENT MANNER WITH PERTINENT DESCRIPTIONS, FACTS, DETAILS, AND EXAMPLES; USE APPROPRIATE EYE CONTACT, ADEQUATE VOLUME, AND CLEAR PRONUNCIATION. ● CCSS.ELA-LITERACY.SL. 7.5 INCLUDE MULTIMEDIA COMPONENTS AND VISUAL DISPLAYS IN PRESENTATIONS TO CLARIFY CLAIMS AND FINDINGS AND EMPHASIZE SALIENT POINTS. ● CCSS.ELA-LITERACY.L. 7. 2 DEMONSTRATE COMMAND OF THE CONVENTIONS OF STANDARD ENGLISH CAPITALIZATION, PUNCTUATION, AND SPELLING WHEN WRITING. ● CCSS.ELA-LITERACY.L. 7.6 ACQUIRE AND USE ACCURATELY GRADE-APPROPRIATE GENERAL ACADEMIC AND DOMAIN SPECIFIC WORDS AND PHRASES; GATHER VOCABULARY KNOWLEDGE WHEN CONSIDERING A WORD OR PHRASE IMPORTANT TO COMPREHENSION OR EXPRESSION. ● CCSS.ELA-LITERACY. RST .6-8.7 INTEGRATE QUANTITATIVE OR TECHNICAL INFORMATION EXPRESSED IN WORDS IN A TEXT WITH A VERSION OF THAT INFORMATION EXPRESSED VISUALLY (E.G., IN A FLOWCHART, DIAGRAM, MODEL, GRAPH, OR TABLE). ● CSS.ELA-LITERACY.RST. 6-8.10 BY THE END OF GRADE 8, READ AND COMPREHEND SCIENCE/ TECHNICAL TEXTS IN THE GRADES 6-8 TEXT COMPLEXITY BAND INDEPENDENTLY AND PROFICIENTLY. ● CCSS.ELA- READINESS. Reading. 6-8.7 Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words. ● CCSS.ELA-READING. 6-8.10. Range of Reading and Level of Text Complexity 10. Read and comprehend complex literary and informational texts independently and proficiently ● CCSS.ELA-LITERACY. WHST.6-8.2 WRITE INFORMATIVE/EXPLANATORY TEXTS, INCLUDING THE NARRATION OF HISTORICAL EVENTS, SCIENTIFIC PROCEDURES/EXPERIMENTS, OR TECHNICAL PROCESSES. ● CCSS.ELA-LITERACY. WHST.6-8.4 PRODUCE CLEAR AND COHERENT WRITING IN WHICH THE DEVELOPMENT, ORGANIZATION, AND STYLE ARE APPROPRIATE TO TASK, PURPOSE, AND AUDIENCE. ● CCSS.ELA-LITERACY. WHST.6-8.5 WITH SOME GUIDANCE AND SUPPORT FROM PEERS AND ADULTS, DEVELOP AND STRENGTHEN WRITING AS NEEDED BY PLANNING, REVISING, EDITING, REWRITING, OR TRYING A NEW APPROACH, FOCUSING ON HOW WELL PURPOSE AND AUDIENCE HAVE BEEN ADDRESSED. ● CCSS.ELA-LITERACY. WHST.6-8.6 USE TECHNOLOGY, INCLUDING THE INTERNET, TO PRODUCE AND PUBLISH WRITING AND PRESENT THE RELATIONSHIPS BETWEEN INFORMATION	articles are about Hawaii specifically, or global warming generally. The teacher also directs the students to note whether the resource is about a problem/issue and/or a solution. Teacher provides the students with a rubric so that they know what to expect their finished product to include and shares some examples with the students to have them evaluate what an infographic might look like. The teacher gives students materials to create a small infographic about their resource topic that will be shared in a Gallery walk on the following day. Before the end of the day, the teacher revisits the class questions about climate change and global warming one last time, and adds, revises or modifies the class questions so that redundant questions and previously answered questions are	After reviewing the resources, the teacher will show the students some Examples of Global Warming Infographics and a Rubric that will be used for the students' created infographics. The students will briefly answer the questions in their small groups about the examples and then as a whole class they will discuss the quality of the examples and the criteria in the rubric. Then students will work together to create an infographic about their topic, identifying if it is Hawai'i specific or not and if it is a problem/issue or a solution or both. They may use computer software or construction paper, markers, crayons, glue, etc. The information on the infographics must include both what is in their resource as well as information from other resources from previous activities in the unit. **The purpose of the infographic is to be presented to the general public as an inspirational and/or informative tool.** The infographics will be displayed and shown the following day during class for peer review. The students once again review the class list of questions and add to it or assist in modifying the questions so that there is no redundancy and the questions have not already been answered from previous readings or activities.

and ideas clearly and efficiently. ● CCSS.ELA-LITERACY. WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. ● CCSS.ELA-LITERACY. WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research. ● CCSS.ELA-LITERACY. WHST.6-8.10 Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. ● MA:Re7.1.Ka Recognize and share components and messages in media artworks. ● MA:Cn10.1.7a Access, evaluate and use internal and external resources to inform the creation of media artworks, such as experiences, interests, research, and exemplary works. ● MA:Cn11.1.7b Analyze and responsibly interact with media arts tools and environments , considering copyright, ethics, media literacy, and social media. ● VA:Cr1.1.7a Apply methods to overcome creative blocks. ● VA:Cr1.2.IIa Choose from a range of materials and methods of traditional and contemporary artistic practices to plan works of art and design. ● VA:Cr1.1.IIIa Visualize and hypothesize to generate plans for ideas and directions for creating art and design that can affect social change. ● VA:Cr2.3.3a Individually or collaboratively construct representations, diagrams, or maps of places that are part of everyday life. ● VA:Cr2.3.4a Document, describe, and represent regional constructed environments. ● VA:Cr2.3.5a Identify, describe, and visually document places and/or objects of personal significance. ● VA:Cr2.3.8a Select, organize, and design images and words to make visually clear and compelling presentations. ● VA:Re7.2.Ka Describe what an image represents. ● VA:Cn10.1.Ka Create art that tells a story about a life experience. ● VA:Cn10.1.2a Create works of art about events in home, school, or community life. ● 1.8.3 Analyze how the environment affects personal health. ● 1.12.3 Analyze how environment and personal health are interrelated. ● 2.8.2 Describe the influence of culture on health beliefs, practices, and behaviors. ● 1.3 Presentational Communication: Learners present information, concepts,		
	removed from the list. Introduce the final Call To Action Product Playlist and Rubric to the students. This will allow the students time to think about what they will want to do for their final product/service.	Students review the Call to Action Final Playlist and Rubric so that they can consider what they might want to do when the unit is over. They do not have to decide yet. They will complete these individually.

and ideas to inform, explain, persuade, and narrate on a variety of topics using appropriate media and adapting to various audiences of listeners, readers, or viewers. ● 3.1 Making Connections: Learners build, reinforce, and expand their knowledge of other disciplines while using the language to develop critical thinking and to solve problems creatively.	

EXPLAIN

DAY 10:

60 MINUTES

MATERIALS

Student computers
- Teacher computer
- Overhead projector
-wifi/internet connection
- construction paper
- colored markers, pencils, crayons
- scissors

STANDARDS

(see Day 9 above)

DAY 10 (60 MINUTES)

Synopsis: In this activity students will be tying things together. Throughout the unit they have been taking turns visiting the field site to collect data and adding to the class data sheet that the teacher manages. They have also been asking questions related to global warming and seeking answers as they have been working through the activities. Finally, they have created an infographic to inspire the general public. This activity provides time to bring these things to a close. **At this point students are organizing their ideas and their answers to their questions to develop their final products for the unit. They are asking "How can we explain global warming to others and share possible solutions for sustainability?"**

Teacher Does/Asks	Student Does/Asks
Teacher directs students to hang their infographics on the wall for a Gallery Walk and organizes students into two groups so that one team member is prepared to share the team's infographic while the other is prepared to offer peer feedback on the other teams' work. Team members switch roles. During the Gallery Walk the students are given colored sticky notes: 1 color for glows (things that were done well) and another color for grows (things that could use improvement). The teacher also offers feedback using sticky notes and verbal comments to teams and monitors how students are interacting with each other. The teacher allows time for the teams to discuss revisions and to work on developing	Students follow the teacher's directions for the infographic Gallery Walk. They consider the Rubric while providing peer feedback and they present their work to their peers. After presenting, students return to their teams of 2 and debrief on the feedback they received as well as what they learned

	their revisions to improve their infographics. The teacher returns to the data from the initial field study and updates the dataset that students have been collecting throughout the past couple of weeks. The teacher asks students to review the data briefly to see if any patterns are emerging yet. It is anticipated that a large change will take place immediately upon the opening of the ahupua'a (within the first couple of weeks) and then smaller changes will take place over a longer period of time as the environment and habitats begin to adjust to the changes. Students will continue to collect data and add to the dataset although this specific unit will be completed, as part of a larger project.	from observing other teams' work and they are given time to revise their infographics. The final product will be displayed outside of the classroom for others to learn from. Students update their data from the ahupua'a that they have been collecting for the class with the teacher. Students analyze the data briefly to identify any obvious patterns that they should be keeping their eyes on.

INSPIRE

DAY 11 & 12:

60 MINUTES

MATERIALS

Student computers
- Teacher computer
- Overhead projector
-wifi/internet connection
- construction paper
- colored markers, pencils, crayons
- scissors
- other materials depend on the types of products that students choose to create as a "final event".

STANDARDS

In addition to the standards from previous days:

- D2.Civ.7.6-8. Apply civic virtues and democratic principles in school and community settings .
- D4.3.6-8. Present adaptations of arguments and explanations on topics of interest to others to reach audiences and venues outside the classroom using print and oral technologies (e.g., posters, essays, letters, debates, speeches, reports, and maps) and digital technologies (e.g., Internet, social media, and digital documentary.)
- CCSS.ELA-LITERACY. WHST.6-8.1 Write arguments focused on discipline-specific content.
- 5.1 School and Global Communities: Learners use the language both within and beyond the classroom to interact and collaborate in their community and the globalized world.
- 1.3 Presentational Communication: Learners present information, concepts, and ideas to inform, explain, persuade, and narrate on a variety of topics using appropriate media and adapting to various audiences of listeners, readers, or viewers.
- 3.1 Making Connections: Learners build, reinforce, and expand their knowledge of other disciplines while using the language to develop critical thinking and to solve problems creatively.

DAY 11-12 (120 MINUTES)

Synopsis: In this activity students must find a way to further inspire and impact the larger community by informing a group or influential person of the issues and/or solutions related to global warming and sustainability challenges specific to Hawai'i. **At this point students are organizing their ideas and their answers to the questions they have been asking to help develop their final products for the unit. They are asking "How can we inspire others to solve issues related to global warming in Hawai'i, to inspire them to MĀLAMA I KA 'ĀINA (protect and respect our land)?"**

Teacher Does/Asks	Student Does/Asks
A single class period of 60 minutes is dedicated to this activity to initially support students in deciding what their final product will be and in receiving both teacher and peer feedback. The teacher provides the students with a Call To Action Product Playlist that provides suggestions of final products that students can create for the unit. Students do not have to choose something from the list. The final products must be approved by the teacher and must reach an audience outside of the classroom. They must inform the intended audience of the problem or issues related to global warming in Hawai'i specifically and offer a call to action or provide a solution that would result in leading towards resilience in the wake of global warming in Hawai'i. Teacher reviews the Call To Action Rubric with the students. **DAY 12**	Students review the Call to Action Product Play List and the Call to Action Rubric and consider what their final product will be. They ● write an outline, or create a prototype, or write a description of their final product, ● identify their audience ● identify how and when they will disseminate or communicate their product with their audience ● Include the main points that will be covered in their product including information such as specific ○ locations ○ issues ○ solutions ○ partnerships Students meet in round robin groups of 3 to share their ideas and receive feedback from their peers. They present their ideas to their peers and take notes of peers' feedback. Students are given more time to return to their own work to revise and rethink their ideas. **DAY 12**

	Teacher schedules a day for final presentations and coordinates students to present their final products 1 at a time in front of the whole class. Teacher provides all students with a rubric which they complete for the presenting peer. Each rubric is given to the presenting peer to consider for improvement prior to presenting or disseminating the final Call To Action product to the intended audience.	Students are given approximately a week to complete their final products. A final day is dedicated to allowing students to showcase their final products to the class to receive teacher feedback and peer review prior to sharing or disseminating their final product with the larger community outside of the classroom. This is structured 1 at a time, in front of the class, with students and teachers asking questions and offering last minute suggestions before the Call To Action Product is presented or disseminated to the intended audience.

TEACHING TIPS

POSITIVES

THE LESSON INTEGRATES ELA, TECHNOLOGY, ENGINEERING, MATH, SOCIAL STUDIES, ART AND SCIENCE. FOR EXAMPLE,

- THE TEACHER COULD USE THE ASSESSMENTS TO IDENTIFY WRITING SKILLS INCLUDING RESEARCH AND CITATION METHODS.
- THE TEACHER COULD HAVE THE STUDENTS COLLABORATE ON A GOOGLE SLIDE DECK TO SHARE THEIR IDEAS AND RESEARCH INFORMATION
- AS WELL AS INDIVIDUALLY INTERACT WITH THE WEBSITES AND SIMULATIONS TO MEET TECHNOLOGY STANDARDS.
- DECIDING ON HOW TO MAKE THEIR CITY RESILIENT IS AN ENGINEERING PROCESS AND LOOKING FOR PATTERNS IN DATA AND INTERPRETING THE INFORMATION MEETS THE MATH STANDARDS.
- EXPLAINING THE CONCEPTS AND INVESTIGATING POSSIBLE SOLUTIONS IS MEETING SCIENCE STANDARDS,
- AS IS UNDERSTANDING THE IMPACT THAT HUMANS HAVE ON OUR PLANET.

- IT WOULD BE OPTIMAL FOR TEACHERS FROM DIFFERENT SUBJECTS TO PRESENT AND TEACH THIS LESSON, FOCUSING ON THE COMPONENT FROM THEIR SPECIFIC SUBJECT AREA.
- TO ENGAGE IN THIS LESSON, STUDENTS DON'T NEED ANY PRIOR KNOWLEDGE OR SKILLS (ALTHOUGH HAVING TECHNOLOGY SKILLS WILL LIKELY ASSIST IN MAKING THE LESSON FASTER AND EASIER FOR THE STUDENTS).
- THE TEACHER DOES NOT NEED TO KNOW THE CONCEPTS IN MORE THAN A GENERAL SENSE SINCE THE STUDENTS ARE CONDUCTING THE RESEARCH AND REPORTING OUT TO THE CLASS. THIS MAKES IT EASIER FOR A TEACHER TO PRESENT THE MATERIAL WHEN EARTH SCIENCES ARE NOT THEIR SPECIALTY.
- THERE ARE A PLETHORA OF RESOURCES (SIMULATIONS, ARTICLES, VIDEOS, ETC.) THAT ARE AVAILABLE ON THIS TOPIC ONLINE FOR FREE. THE TEACHER CAN EASILY FIND ADDITIONAL RESOURCES TO ELABORATE ON THE CONCEPTS PRESENTED IN THE LESSON.

ADDITIONAL PRE-REQUISITES

- SOME STUDIES HAVE SHOWN THAT STUDENTS DEVELOP ANXIETIES ABOUT THE POSSIBILITY OF GLOBAL WARMING. EMPHASIZING THE POSSIBILITIES RELATED TO RESILIENCE CAN HELP REDUCE THOSE ANXIETIES.
- IT IS IMPORTANT TO SHARE WITH THE STUDENTS THAT CLIMATE CHANGE IS A NATURAL PROCESS THAT HAS TAKEN PLACE SINCE THE EARTH WAS FORMED. THERE ARE SEVERAL FREE RESOURCES THAT CAN BE FOUND IN A GOOGLE SEARCH THAT SHOW THE HISTORY OF THE EARTH'S CHANGING CLIMATE.
- IT IS IMPORTANT TO DISTINGUISH THE DIFFERENCE BETWEEN CLIMATE CHANGE AND GLOBAL WARMING. THEY ARE OFTEN DISCUSSED AS IF THEY ARE THE SAME CONCEPT, BUT THEY ARE NOT.
- AL GORE'S VIDEO, "AN INCONVENIENT TRUTH", IS A DECENT VIDEO TO WATCH TO GIVE AN OVERVIEW OF THE EVIDENCE PEOPLE USE TO CLAIM THAT GLOBAL WARMING IS ANTHROPOGENIC. TEACHERS MAY STILL BE ABLE TO GET A FREE COPY.
- BEFORE USING THE LINKS IN THIS LESSON PLAN WITH THE CLASS, THE TEACHER SHOULD BE FAMILIAR WITH THE INFORMATION AND TOOLS AVAILABLE IN EACH LINK. THERE IS A LOT OF DATA AND INFORMATION AND IT COULD BE OVERWHELMING FOR STUDENTS, OR EVEN DISTRACTING. GIVE TIME LIMITS ON EACH SITE WITH SPECIFIC DIRECTIONS ABOUT WHAT THEY ARE TRYING TO LOOK FOR. OR BE PREPARED TO SHARE YOUR SCREEN WITH YOUR VIEWS OF THE DATA FOR THE DISCUSSIONS.
- THE WEBSITES HAVE TUTORIALS THAT WILL HELP TEACHERS LEARN HOW TO USE THE TOOLS AND HOW TO PRESENT THE DATA.

DIFFERENTIATION	● TO REDUCE THE AMOUNT OF TIME FOR THIS LESSON, THE TEACHER COULD GO TO THE WEBSITES IN A WHOLE CLASS PRESENTATION (DURING THE FIRST 3 DAYS - INQUIRY SECTION) RATHER THAN HAVING THE STUDENTS INDIVIDUALLY TRY TO MANIPULATE THE MODELS AND THE SIMULATIONS. DISCUSSIONS COULD STILL BE MANAGED IN SMALL GROUPS BUT THE TEACHER WOULD MANAGE THE TECHNOLOGY COMPONENT. ● FOR DAY 3, STUDENTS COULD INCLUDE SPECIFIC EVIDENCE TO SUPPORT THE CLAIM THAT GLOBAL WARMING IS A CONCERN FOR HAWAI'I AND/OR THE REST OF EARTH, IN THEIR DESCRIPTION OF GLOBAL WARMING. ● CREATE A WORD WALL PRIOR TO THE LESSON. AS THE VOCABULARY IS MENTIONED OR BROUGHT UP, ASSIGN A STUDENT TO PROVIDE A DEFINITION, EXPLANATION OR DRAWING TO HELP OTHERS KNOW THE MEANING OF THE TERM. YOU COULD HAVE 3 DIFFERENT STUDENTS PROVIDE THE INFORMATION IN 3 DIFFERENT WAYS. ● RATHER THAN HAVING STUDENTS CONDUCT THE RESEARCH DURING THE INQUIRY SECTION, THE TEACHER COULD HAVE SPECIFIC VIDEOS OR ARTICLES FOR THE CLASS TO WATCH/READ SO THAT THEY ALL HAVE THE SAME INFORMATION. THIS WOULD ALSO HELP REDUCE THE TIME TO TEACH THE WHOLE LESSON. ASSIGNING THE VIDEOS AND READINGS AS HOMEWORK WOULD ALSO REDUCE THE CLASS TIME AND WOULD PREPARE THE STUDENTS FOR WHOLE CLASS DISCUSSIONS.
RESOURCES AND LINKS	BECAUSE THIS DOCUMENT MAY NOT SAVE THE EMBEDDED LINKS FROM ABOVE, THE LINKS ARE LISTED BELOW IN THE ORDER THAT THEY ARE IMPLEMENTED IN THIS PROJECT UNIT: **NOTES** **DAY 1:** MAUNALUA HERITAGE FISHPOND ORGANIZATION WAS THE INITIAL LESSON'S MENTOR AND COMMUNITY PARTNERSHIP FOR THIS PROJECT UNIT. KU'OU'LI'OU BEACH PARK ACROSS AND UP TO MAUNALUA FISHPOND IS THE FIELD STUDY SITE WHERE STUDENTS ARE INITIALLY INTRODUCED TO AN AHUPUA'A. THIS SITE WILL BE VISITED SEVERAL TIMES TO FACILITATE STUDENT DATA COLLECTION OF SEMI-LONGITUDINAL DATA TO INVESTIGATE VARIABLES SUCH AS LIVING ORGANISMS,ANTHROPOGENIC FACTORS, ENVIRONMENTAL FACTORS, ATMOSPHERIC FACTORS, AND ECOSYSTEM OF AN AHUPUA'A
	CC. S.P.SCHLEIGH

Aqua link	# Links Monitoring for Marine Ecosystems: https://aqualink.org