TGC Fellow Globalized Unit Plan

Prepared by: **Wendy Rago** School/Location: **Pembroke Pines Charter High School**

Subject: **Pre-AICE Biology (Honors)** Grades: **9-10** Unit Title: **Ecology – *Human Impact on the Environment***
Time Needed: **5-6 weeks**

Unit Summary:

Students will develop a proficient level of understanding in the role of humans and natural ecological interactions. Students will begin by assessing their knowledge of climate change and developing content knowledge of natural global cycling patterns through class assignments. Students will conduct scientific experiments of their school's atmospheric and soil conditions, and upload their data into the international database (provided through GLOBE.gov). They will record and analyze soil conditions, weather and climate patterns, and make connections to content knowledge. Students will identify causes, effects, and evaluate scientific claims of anthropogenic global environmental issues (climate change, natural resource usage, and pollution). Students will discuss and evaluate the validity of global warming claims through research and interpretation of scientific data (using articles/interviews and GLOBE data history). Teacher arranged interviews with environmental experts will provide students with a more in depth study and the opportunity to probe arguments (via Skype or another online video conferencing)
Time frame: 2 weeks

Next, students will be assigned to groups where they will choose a region of the world to study global environmental issues in further depth. The groups will research that particular region's major anthropogenic environmental issues (i.e. habitat destruction, pollution, overuse of natural resources, smog and acid rain, etc.), discovering the context to which these issues in arise. Students use the GLOBE database to view past documented data and construct a Google Map to track their findings in the region. ***Time frame: 2 weeks***

Students will produce their own Public Service Announcement media presentation of their findings on ONE anthropogenic environmental issue studied within the unit. The PSA will provide background context of the cause, effect, and suggest possible solutions for addressing the issue. Students will need to provide a least one suggestion for addressing the issue at the local level, national and global level ***Time frame: 1-2 weeks***

Stage 1 Desired Results

ESTABLISHED GOALS:

Florida State Science Standards:

SC.912.N.1.3 Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.

SC.912.L.17.13 Discuss the need for adequate monitoring of environmental parameters when making policy decisions.

Transfer

Students will be able to independently use their learning to…(real world purpose)

T1. Investigate the world beyond their immediate environment.

T2. Identify their role as a human in altering natural ecological systems.

T3. Develop a critical lens for which to view human's ecological impact from different countries and recognize perspectives.

T4. Take action in their own homes or local community to reduce human impact on ecological systems.

SC.912.L.17.16 Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.
SC.912.L.17.20
Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.

Florida State Social Studies Standards:
SS.912.G.1.4 Analyze geographic information from a variety of sources including primary sources, atlases, computer, and digital sources, Geographic Information Systems (GIS), and a broad variety of maps.
SS.912.G.3.2 Use geographic terms and tools to explain how weather and climate influence the natural character of a place.
SS.912.G.3.3 Use geographic terms and tools to explain differing perspectives on the use of renewable and nonrenewable resources in Florida, the United States, and the world.
SS.912.G.3.5 Use geographic terms and tools to explain how hydrology influences the physical character of a place.
SS.912.G.5.2 Analyze case studies of how changes in the physical environment of a place can increase or diminish its capacity to support human activity.
SS.912.G.5.3 Analyze case studies of the effects of human use of technology on the environment of places.
SS.912.G.5.4 Analyze case studies of how humans impact the diversity and productivity of ecosystems.

Florida State Language Arts (Reading, Writing, Speaking, and Listening) Standards:
LACC.910.RST.3.9 Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting support and contradictions in previous accounts.

Meaning

UNDERSTANDINGS

Students will understand that…

U1. The need for an adequate monitoring of environmental parameters when making policy decisions.
U2. Solutions for addressing global environmental issues are interconnected
U3. A variety of perspectives exist regarding global environmental issues and scientific data can be interpreted differently.
U4. Complicated scientific data needs to be analyze, interpreted, and presented in a simplified way that the masses can understand.

ESSENTIAL QUESTIONS

E1. How are humans altering natural ecological systems throughout the world?
E2. What global environmental issues are most relevant to certain regions of the world?
E3. How can human needs and ecological systems be balanced to ensure sustainability of global resources?

Acquisition

Students will know… (Content)

K1. The anthropogenic cause and effect of acid rain and smog on the environment.
K2. The anthropogenic cause and effect of ozone depletion.
K3. The anthropogenic causes and effects of climate change.
K4. The differences in source causes of climate change *(greenhouse gas emissions)* and ozone depletion *(CFC's)*
K5. Case study examples of global environmental issues in various regions of the world *(i.e. groundwater pollution, extinctions of species through habitat destruction)*
K6. Local and global environmental efforts to protect natural ecological systems.
K7. Differing scientific viewpoints on global warming trends and its impact

Students will be able to… (Skills)

S1. Take precise measurements using scientific tools (i.e. temperature, pH, wind direction)
S2. Make observations, collect and display local atmospheric and soil conditions data.
S3. Identify trends in scientific data and draw conclusions.
S4. Predict climate patterns of a region of the world using geographic terms and maps.
S5. Predict the impact of individuals on environmental systems and/or sustainability.
S6. Evaluate a variety of perspectives, synthesize ideas and data, and draw conclusions.
S7. Think critically about a disparate set of ideas and analyze claims.
S8. Work collaboratively with a group to share data and reflect the overall trends of an experiment in a creative and simplified way.
S9. Develop professional marketing and technological skills that presents complicated

LACC.910.RST.3.7 Translate quantitative information expressed in words into a visual form (table/chart). LACC.910.W.2.6 Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LACC.910.SL.2.5 Make strategic use of digital media (e.g. textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and add interest. **GLOBAL COMPETENCIES**: 1) Investigate the World 2) Communicate ideas 3) Weigh Perspectives 4) Take Action **RESOURCES:** • ***The GLOBE Program*****:** www.globe.gov • ***Environmental Concepts Animations*** *(Class website***:** www.msrago.com) various ecological topics (ozone depletion, greenhouse effect, acid rain and smog formation, etc.) • http://authoring.concord.org/sequences/47 global cycling patterns; climate change; interactive tutorials with questions • ***Google Maps*****:** Students create maps to track data points of studied locations and their findings (from GLOBE database, interviews, research, etch) www.thinklink.com		information into "digestible chunks" for the masses to understand.

• **Padlet:** *weekly responses and reflections* • **Google Docs/Sheets:** *for data tables/graph* • **Glogster:** *digital poster making* • **Bubbl.us**: digital graphic organizer of climate change arguments/research https://goo.gl/images/RNFSOi Www.bubbl.us (Digital) **Climate Change Resources and Arguments:** • *National Geographic Education:* **http://nationalgeographic.org/education/?ar_a=1** • *Environmental Protection Agency:* **www.epa.gov/climatechange/science/overview** • *Wall Street Journal:* No Need to Panic About Global Warming (Video) • Physicist William Happer interview - denies climate change • *Video*: **Fool me once: "Global Warming has stopped"**		

Stage 2 - Evidence

Assessment	Evaluation Criteria (Learning Target or Student Will Be Able To)
Assessments **FOR** Learning: ★ *KWL chart* - TOPIC**:** *Climate Change* ★ *Diagrams of natural and anthropogenic ecological processes* ★ *Google Maps* ★ *Data tables* constructed and shared with group members- using Google Sheets/Docs ★ *Graphic organizer* for climate change arguments *Example*: https://goo.gl/images/RNFSOi Www.bubbl.us (Digital option) ★ *Padlet* - weekly posted questions requiring student responses (Final conclusion to global warming arguments, content review, interviews with scientists reflections, questions for further study)	**STUDENTS WILL BE ABLE TO:** ★ Assesses their own prior knowledge of climate change using a KWL chart, answering what they KNOW and WANT to know about the topic. ★ Complete graphic organizers and diagrams using animations and online tutorials *(natural processes - Greenhouse effect and global climate patterns; anthropogenic processes -acid rain formation and ozone depletion)* ★ Construct and maintain data tables for recording school data and uploading data into the GLOBE database (wind direction, cloud coverage, water pH, air temperature, soil pH, soil moisture, content, etc.) ★ Maintain a notebook of questions, notes, and key points discovered regarding climate change as researched through class readings, videos, discussions and scientist interviews. ★ View an alternative view that counter argues against global warming and construct a digital graphic organizer highlighting the two sides of the argument using **Bubbl.us** ★ Evaluate the arguments of global warming and draw a conclusion on its validity. Post conclusion to Padlet. ★ Post a weekly response on Padlet with teacher guided questions (Final conclusion to climate change argument, assessment questions of content, reflections from scientist interviews) ★ Construct a Google Map with content points/data collected of their region of choice.
Assessment **OF** Learning: (ex: performance task, project, final paper) ★ *KWL chart* - TOPIC**:** Climate Change ★ *Digital poster - Glogster* ★ M*ultimedia group Public Safety Announcement* - student choice of format *(*recorded video or presentation to the class using Peardeck, Prezi, Adobe Spark video etc.)	**STUDENTS WILL BE ABLE TO:** ★ Complete their initial KWL chart, answering what they LEARNED about climate change. ★ Create a digital poster of our school's experimental weather/climate data as compared to a school in the region researched through GLOBE. (BONUS POINTS: 1 poster/group will be selected to print out and showcase around the school!) ★ Post to Padlet what they were most surprised to learn in their research of their region and its anthropogenic environmental issues. ★ Create a PSA presentation ONE anthropogenic environmental issue studied within the unit. The PSA must include the cause, effect, and possible solutions for addressing the issue at all levels (local, national and global)

Stage 3 – Learning Plan

Summary of Key Learning Events and Instruction:

Week One: Students will assess their own prior knowledge of climate change and be introduced to how natural global ecological systems function (i.e. natural greenhouse effect and ozone layer protection). Students will be able to describe how humans have disrupted natural ecological cycling patterns, understanding the connection between the anthropogenic causes and effects of acid rain, industrial smog, ozone depletion and climate change. Students will utilize online animations, videos, analysis of authentic weather/climate data, and graphic organizers to process and organize their learning. Students will respond online to teacher guided questions and share their reflections of scientist interviews (Padlet). Students will also be instructed on proper experimentation protocols to begin conducting and uploading local school weather data into GLOBE database.

Week Two: Students will compare and contrast scientific research and evidence presented through use of online texts, video, class discussions and scientist interviews on global climate change. Students will identify arguments supporting and refuting global warming (digital graphic organizer- Bubbl.us), evaluate the arguments to draw a conclusion, share their conclusion with their peers via online post (Padlet), and reflect on their learning by completing the KWL chart. Students will continue to conduct daily experimentation of GLOBE protocols and upload data into database. Students will be responsible to track data via Google sheets.

Week Three: *Students will work in small groups to* choose one region of the world and research its major anthropogenic environmental issues (i.e. habitat destruction, pollution, overuse of natural resources, smog and acid rain, etc.). Students will identify the causes, effects, and detailed context of the issues, utilizing the region's weather/climate history documented in the GLOBE database and other online sources (i.e. Skype interviews, National Geographic video and content, etc.). Students will work collaboratively to organize their group's research using Google Docs and Google Maps of data collected of their region of interest. Students will continue to conduct daily experimentation of GLOBE protocols

Week Four: Students will compare and contrast school GLOBE protocol with GLOBA data from the region they are studying. Students will continue to work in their group and create a digital poster of showcasing the similarities and differences. Group posters will be shared online and 1 poster per class will be selected, printed, and showcased around the school! Students will reflect on their learning, identifying surprises found in their regional research of anthropogenic environmental issues.

Week(s) Five/Six: Student will demonstrate their knowledge of human impact on ecological systems by creating a Public Service Announcement (PSA) presentation. Students will use a PSA format to identify ONE anthropogenic environmental issue studied within the unit and address its cause and effect. Students will be required to discuss possible solutions for addressing the issue at all levels (local, national and global). Students will choose their presentation modalities, using various digital resources their choice (i.e. recorded videos, PearDeck, Prezi, Adore Spark video, etc.) and presentations will be shared with the class.

**adapted from Understanding by Design Model*

TGC FELLOWS UBD Lesson Plan **Unit Plan: Ecology – Human Impact on the Environment**	
Lesson Title: *What happened to Hispaniola?*	Time needed: **Two 50 min. class periods**
Subject: **Pre-AICE Biology (Honors)**	Prepared by: **Wendy Rago**
Materials Needed: **Teacher Projected Map of World (Google Map), Student Laptops, Internet access, Google Docs/Maps, GLOBE database, Google Doc of Helpful Research website links (shared with students prior to lesson)**	
Global Competency: **Investigating the World, Recognizing Perspectives, Communicating Ideas**	
Where is the lesson going? (Learning Target or SWBAT)	C.912.L.17.16 Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution. SS.912.G.5.3 Analyze case studies of the effects of human use of technology on the environment of places.

	SS.912.G.5.4 Analyze case studies of how humans impact the diversity and productivity of ecosystems. **LT: Students will be able to identify major anthropogenic environmental issues faced in ONE particular region of the world.**

Hook: **Aerial Photo of the Island of Hispaniola**	**T**ailored Differentiation:
• *Show students aerial photograph of the Island of Hispaniola, identifying Haiti and the Dominican Republic.* ***PHOTO*** *(Satellite image of the Haitian/Dominican border)* • *Ask students what they can observe from the photo and record answers on the board for the class to see. (i.e. tree line, distinguishing country boarder; green vs. brown areas, etc.)* • *How do you think the island got this way? WHY is there such a distinct difference between the vegetation in Haiti vs. D.R.? Probe for possible reasons.* • *Based on previous discussions on anthropogenic environmental issues, ask students to predict some to the local environmental issues Haiti and D.R. might be facing (i.e. deforestation, flooding, habitat destruction, climate change- water level rising, etc.)* • *What would these differences mean for the people that live there? Highlight how these might be more impactful on Haiti than D.R. and discuss potential reasoning (more protected natural areas = more trees= less flooding due to roots hold soil; less drying of land)* • Have students open laptops and read the article *An Island Divided: What We Must Learn From the Tragedy of Hispaniola* and discuss points mentioned prior to reading the article.	• *Students can select region of the world to investigate with their group, based on their collective interests. A list of global regions will be provided by teacher, to not allow too much overlap. But adjustments can be made based on student interest.* • *Students can pick an environmental issue that they are interested in (habitat destruction, protection of a particular animal species, etc.)* • *Data points will include impactful photos of issues, not only text, for visual learners (example: Hispaniola satellite photo)*
Equip:	
Teacher will model and walk students through their regional environmental research assignment, by having students look up documented GLOBE weather and climate data for Dominican Republic and Haiti. Half of the class will be responsible for researching Haiti weather/climate data and several key	

environmental issues the country faces. The other half of the class will research Dominican Republic. Students will input data points as a class, onto a teacher-created Google Map projected for all to view. Teacher will guide research by providing some important websites and feedback on group posts to map.
Day 2- Review map researched points of Haiti and D. R as a class. Students will discuss with their group other areas of the world they are interested in studying further. Students will then select and identify on the map the region of the world to begin researching.

Rethink and revise:

Student will look for recent or current satellite images, aerial photos, and other visuals from their chosen region of choice. Students will compare images to regional GLOBE data collected and link images to the class Google Map (or ThingLink?).

Evaluate:

After first day of research and data collection, give each group feedback on data points and share best ideas posted so far on the class map. Highlight strong examples of visuals to help guide students for second class session of research.

Notes:

-Review definition of *anthropogenic.*

-Test out Google Map vs. ThingLink to identify a more user friendly option for students

- Post Global Regions List for student reference.
    - Central America
    - South America- above equator
    - South America- below equator
    - Western Europe
    - Eastern Europe
    - Scandinavian region
    - Northern North America – above U.S.
    - Northern Africa- above equator
    - Middle East
    - Southern Africa- below equator
    - South Pacific
    - Eastern Asia

Organization:

Have tables already arranged into groups of 4, laptops charged, aerial photo projected on front screen, and document of "Helpful Research Links" already shared with students through Gmail.