

**PROJECT PLANNING FORM**

<b>PROJECT OVERVIEW</b>		
<b>Name of Project:</b>	<b>What Difference Can a Few Degrees Make? (Intro Module to much larger project)</b>	<b>Duration: 2 weeks max for this module</b>
<b>Subject/Course:</b> RSP9 or an Environmental Science class	<b>Teacher(s):</b> C Burch	<b>Grade Level:</b> 9-12
<b>Other subject areas to be included, if any:</b>	<b>Math, Geography, ELA could be connected</b>	
<b>Project Idea</b> Summary of the issue, challenge, investigation, scenario, or problem:	<b>LARGER PROJECT:</b> Students will investigate climate data to explore how slight changes in temperature that models predict for 2050 and 2099 might impact their lives and environment around them. <b>Intro Module:</b> In the process students will work to differentiate between weather and climate tying concepts to biomes and later use the deeper understanding of climate to think about the future.	
<b>Driving Question</b>	What does knowing an area's climate tell you that just knowing an area's weather does not? When would you want to know one or another?	
<b>Content and Skills Standards</b> to be addressed:	<p>Next Generation Science Standards (draft)</p> <p>Evaluate and communicate the climate changes that can occur when certain components of the climate system are altered.</p> <p>Use global climate models in combination with other geologic data to predict and explain how human activities and natural phenomena affect climate, providing the scientific basis for planning for humanity's future needs.</p> <p>Construct explanations, from models of oceanic and atmospheric circulation, for the development of local and regional climates.</p>	
<b>Culminating Products and Performances</b> List all the products that groups will complete and those completed by individuals		<b>Presentation Audience:</b>
<b>Group:</b>	Whole class discussions and presentations	Class <span style="float: right;">X</span>

		Experts	
<b>Individual:</b>	Small group discussions by individual participants within their groups	Web	
		Other:	
		Other:	

**PROJECT OVERVIEW**

<b>Entry event to launch inquiry, engage students:</b>	<b>Use CHANGEVIEWER tool to visualize sea level rise globally and engage in conversation of how this impacts their adult lives</b> <a href="http://www.climatechangehumanhealth.org/changeviewer/">http://www.climatechangehumanhealth.org/changeviewer/</a>				
<b>Assessments</b>	<b>Formative Assessments (During Project)</b>	Journal/Learning Log		Practice Presentations	
		Preliminary Plans/Outlines/Prototypes		Notes	
		Rough Drafts		Checklists	
		Online Tests/Exams		Concept Maps	<b>X</b>
		Written Product(s), with rubric:		Other:	<b>X</b>
	<b>Summative Assessments (End of Project)</b>	Oral Presentation, with rubric	<b>X</b>	Other Product(s) or Performance(s), with rubric	
		Multiple Choice/Short Answer Test	<b>X</b>	Peer Evaluation	<b>X</b>
		Essay Test		Self-Evaluation	<b>X</b>
Computer lab			Other: Graphs and Excel Data presentation	<b>X</b>	
<b>Resources Needed</b>	<b>On-site people, facilities:</b>	Computers with Google Earth and internet access for ChangeViewer			
	<b>Equipment:</b>	Individual basis as needed			
	<b>Materials:</b>	none			
	<b>Community</b>	Journal/Learning Log			

	<b>resources:</b>			
<b>Reflection Methods</b>	<b>(Individual, Group, and/or Whole Class)</b>	Whole-Class Discussion	X	Focus Group
		Survey		Fishbowl Discussion
		Survey		

**PROJECT TEACHING AND LEARNING GUIDE**

<b>Project: Weather and Climate</b>	<b>Course/Semester: RSP9 Fall</b>
<b>Knowledge and Skills Needed by Students</b> to successfully complete culminating products and performances, and do well on summative assessments	<b>Scaffolding / Materials / Lessons to be Provided</b> by the project teacher, other teachers, experts, mentors, community members
Excel data table creation and graphing	→ Intro lesson to using Excel and how to graph (can provide template for students needing more support)
Online weather data collection and analysis	→ Demonstrate web resources and how to search for data to use Go through a sample site (not in CA or NY study area) and show what, how, and why data values are being collected and analyzed.
Koppen classification	→ Demonstrate classification system and go through one example together

**P R O J E C T   C A L E N D A R**

**Project: Weather and Climate**

**Start Date: Sept 2012**

M O N D A Y

T U E S D A Y

W E D N E S D A Y

T H U R S D A Y

F R I D A Y

**P R O J E C T   W E E K   O N E**

Sea level change viewer and class discussion

Introduce LARGER project

Introduce module

- A. Ask class what they think makes climate different than weather
- B. Ask class to compare California and New York weather on a typical day “like today” and the climate differences
- C. Determine the major differences between CA and NY climate extremes
- D. Inquire about snow differences between CA and NY

- A. Show: **What’s the Difference Between Weather and Climate?** National Geographic video (3:22)  
<http://video.nationalgeographic.com/video/science/earth-sci/climate-weather-sci/>
- B. **Introduce Weather Underground website and weather data available**  
Form small groups (2 – 3) to work together throughout Climate Change unit
- C. Using the student responses about what the weather is like in (CA or NY) use Weather Underground to see what it is actually like across a variety of locations, including the study area weather station locations.
- D. Use Google Earth to “Fly” from Buffalo to Santa Cruz  
-While in Buffalo elicit factors that might effect Buffalo weather and climate, then do the same for Santa Cruz. Expand to larger view of CA and elicit factor differences for an inland location within the CA study area’s region.
- E. Introduce Excel for creating data tables. Show how to organize data, label rows and columns, and format data.

- A. Record daily weather data: (Each small group will pick 2 to 3 locations for each state, at least one lower elevation one higher elevation. Pairs will be responsible for 4 locations total, group will record data for 6 stations)  
Use [www.wunderground.com/](http://www.wunderground.com/)
- B. Show video: **Piecing Together the Temperature Puzzle**  
<http://climate.nasa.gov/warmingwor>
- C. Find monthly average temperature and precipitation data for selected area locations at  
<http://countrystudies.us/united-states/weather/>  
Construct and record data in Excel spreadsheet.

## PROJECT WEEK TWO

<p>A. Create and print out (or submit digital image for teacher display) climate bar graphs in Excel to visualize the differences and similarities between the locations selected. While in small groups, summarize the precipitation and temperature patterns over a year to share in larger class discussion.</p> <p>B. As a whole group, discuss similarities and differences of climate graphs across the locations of the two study areas.</p> <p>C. Create a whole class list of variables, factors, climate characteristics, and whatever else students deem important based on the discussion of climate graphs.</p>	<p>A. (Whole class or small groups) Explore world climates and learn more about climate characteristics and the Köppen Climate Classification System  <a href="http://www.blueplanetbiomes.org/climate.htm">http://www.blueplanetbiomes.org/climate.htm</a>          (Higher level students may also explore <a href="http://www.physicalgeography.net/fundamentals/7v.html">http://www.physicalgeography.net/fundamentals/7v.html</a> for a detailed description of climate variables and classification using the Köppen Climate Classification System.)</p> <p>(Higher level students may explore additional World Map &amp; Additional Average Monthly Climate Data  <a href="http://www.climate-zone.com/index.htm">http://www.climate-zone.com/index.htm</a>)</p>	<p>A. Small groups - Students classify the climates of their selected stations using the Köppen Climate Classification System.</p> <p>B. Small groups- Students finalize the daily weather data collection in Excel and compare weather data of selected locations in NY and CA discussing similarities and differences.</p> <p>C. Small groups share their Köppen classifications for selected study area stations with whole class. Whole class will reach consensus about classification for each location.</p> <p>D. Small groups share DAILY collected data in a whole class discussion of the study area station locations within a single area and then compare the NY and CA areas.</p> <p>A. Small groups explore the relationship between climate characteristics and Biomes  <a href="http://www.blueplanetbiomes.org/world_biomes.htm">http://www.blueplanetbiomes.org/world_biomes.htm</a></p> <p>B. Each small group randomly assigned a single biome type to profile, distributing biome types across whole class.</p>	<p>A. Final climate graphs submitted by small groups in electronic form (PPT, Wiki page, Word doc, etc)</p> <p>B. Small groups present brief biome profiles to class</p> <p>C. Quiz:          -Students individually summarize the difference between weather and climate in a short paragraph to hand in.          -Given three different climate graphs, students individually describe the climate characteristics shown by each of the graphs.          -Students characterize similarities and differences of the NY and CA study areas in terms of current weather.          -Students characterize climate similarities and differences within each of the two study areas.          -Summarize the general relationship between climate characteristics and biomes and provide two examples from the NY and/or CA study areas.</p>	<p>NOTE: Next lessons will extend ideas from lesson.</p> <p>Higher level students Create a travel product (brochure, podcast, v poster, etc) promoting tourism in one of the areas that includes climate and biome information</p>
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## Map the Project

List the key dates and important milestones for this project.

### Day 2:

- Discover misconceptions about weather vs climate
- Discover climate/weather stereotypes held about CA and NY
- Students can describe the difference between weather and climate and provide examples of each.
- Students form groups that will work cooperatively over time.
- Students become familiar with locations of the study area stations, and how they may differ weather-wise.
- Students make connections to the effects of bodies of water (lake vs. ocean), latitude of locations, and topography (possibly) for local weather & climate.
- **Create daily weather data table in Excel**

### Day 3-4:

- Record the selected location's high temp, low temp, precipitation, sky, wind speed and direction at noon (or early afternoon), and air pressure in the excel spreadsheet created. Record the previous day's values as well as current day's values.
- From video: Relate angle of sun's incoming energy, reflectivity of surfaces, clouds, aerosols in atmosphere, greenhouse gases, and water vapor to Earth's energy balance, surface temperature, and climate change variables being monitored by NASA.
- Create new Excel data table for entering and graphing monthly average temperature and precipitation for selected location(s).

### Day 5-6:

- Use graphical representations to compare and contrast precipitation trends and temperatures across a 12 month period to understand a location's climate.
  - Observe similarities and differences between climate graphs from different locations.
  - Begin to identify variables, factors, and characteristics of climates.
  - Students classify climates using the Köppen Climate Classification System.
- \*\*Note:** The daily weather data will continue to be collected during this time

### Day 7:

- Students apply Köppen Climate System to study areas and reach consensus
- Students identify the differences and similarities of weather variables within and between the two study areas.
- Students connect climate and predominant vegetation types that classify biomes.

### Day 8-9:

- Students present scientific data in graphical form to characterize climate variables of temperature and precipitation.
- Students communicate biome profiles to whole class.
- Students communicate in writing their understanding of how weather and climate area different.
- Student interprets climate graphs.
- Students identify the differences and similarities of weather variables within and between the two study areas.
- Students characterize the climate across each of the study areas in NY and CA.
- Students identify climate characteristics and biome type for two locations from NY and/or CA study areas.

List preparations necessary to address needs for differentiated instruction for ESL students, special-needs students, or students with diverse learning styles.

Provide templates for Excel data

Provide simpler tasks in biome assignment

Challenge higher level students to use primary source materials for additional information to share with class via wiki

- *What do you expect to learn from this project?*
- *What challenges or problems might arise in this project?*

Students may be absent from group aspects and cause struggles/frustration for others

Political values may arise in class discussions and need to be redirected to SCIENCE RESEARCH

What do students need to know and be able to do to complete the tasks successfully? How and when will they learn the necessary knowledge and skills? Look at one major product for the project and analyze the tasks necessary to produce a high-quality product. Then, copy and insert subsequent charts for other major products (think end of unit products) for the unit if needed.

**Product:**

KNOWLEDGE AND SKILLS NEEDED	ALREADY HAVE LEARNED	TAUGHT BEFORE THE PROJECT	TAUGHT DURING THE PROJECT
1. Basic weather variables and energy exchanges	Middle school		
2. Terrain influences, ocean currents, global winds... weather and climate effects			Reviewed/reinforced
3. Excel data entry and graphical analysis – data visualization			Introduced and reinforced
4. Group skills: communication, responsibility, time management Presentation skills- visual and oral communication of scientific information	Hopefully!		Reinforced!
5. GIS and Google Earth data viewing and manipulation			Taught
6. Koppen classification			Taught
What project tools will you use to help students prepare, develop and produce this product? <input type="checkbox"/> <b>Know/need to know lists</b> <input type="checkbox"/> Daily goal sheet <input type="checkbox"/> Journals <input type="checkbox"/> Briefs <input type="checkbox"/> <b>Task lists</b> <input type="checkbox"/> Problem logs	<input type="checkbox"/> ___ Task sheets _____ <input type="checkbox"/> _____ <input type="checkbox"/> _____ <input type="checkbox"/> _____ <input type="checkbox"/> _____ <input type="checkbox"/> _____		

- *Do the products and tasks give all students the opportunity to demonstrate what they have learned? I think so!*