

Lesson Author(s)	Jonathan Nishimoto		
Lesson Title	Zombie Madness		
Lesson Source			
Technology Needs (if any)	ArcGIS mapping tool		
Date/Time Lesson to be Taught			
School			
Supervising Teacher			
Math or Science?	Science		
Lesson Concepts	Reading geographic distributions of the US from various GIS map layers		
Objectives	Students will be able to analyze various aspects of GIS layers and determine from this evaluation the most optimal refuge in the event of a zombie apocalypse.		
CO State Standards	Content Area: Science Standard: 2. Life Science Prepared Graduates: > Explain and illustrate with examples how living systems interact with the biotic and abiotic environment Grade Level Expectation: High School Concepts and skills students master: 2. The size and persistence of populations depend on their interactions with each other and on the abiotic factors in an ecosystem <table border="1"> <tr> <td> Evidence Outcomes Students can: - Analyze and interpret data about the impact of removing keystone species from an ecosystem or introducing non-native species into an ecosystem (DOK 1-3) - Describe or evaluate communities in terms of primary and secondary succession as they progress over time (DOK 1-2) - Evaluate data and assumptions regarding different scenarios for future human population growth and their projected consequences - Examine, evaluate, question, and ethically use information from a variety of sources and media to investigate ecosystem interactions (DOK 1-2) </td><td> 21st Century Skills and Readiness Competencies Inquiry Questions: - How do keystone species maintain balance in ecosystems? - How does the introduction of a non-native species influence the balance of an ecosystem? - How is the succession of local organisms altered in an area that is disturbed or destroyed? Relevance and Application: - Earth's carrying capacity is limited, and as the human population grows, we must find ways to increase the production of resources all people need to live. - The extraction of resources by humans impacts nature ecosystems. Nature of Science: - Critically evaluate scientific explanations in popular media to determine if the research methodology and evidence presented are appropriate and sufficient to support the claims. (DOK 2-3) </td></tr> </table>	Evidence Outcomes Students can: - Analyze and interpret data about the impact of removing keystone species from an ecosystem or introducing non-native species into an ecosystem (DOK 1-3) - Describe or evaluate communities in terms of primary and secondary succession as they progress over time (DOK 1-2) - Evaluate data and assumptions regarding different scenarios for future human population growth and their projected consequences - Examine, evaluate, question, and ethically use information from a variety of sources and media to investigate ecosystem interactions (DOK 1-2)	21st Century Skills and Readiness Competencies Inquiry Questions: - How do keystone species maintain balance in ecosystems? - How does the introduction of a non-native species influence the balance of an ecosystem? - How is the succession of local organisms altered in an area that is disturbed or destroyed? Relevance and Application: - Earth's carrying capacity is limited, and as the human population grows, we must find ways to increase the production of resources all people need to live. - The extraction of resources by humans impacts nature ecosystems. Nature of Science: - Critically evaluate scientific explanations in popular media to determine if the research methodology and evidence presented are appropriate and sufficient to support the claims. (DOK 2-3)
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Materials List and Advanced Preparation	ArcGIS computer program available to all students. Possible zombie attire for the teacher.		

	notebook paper for the students.
Safety	Standard classroom management.
Accommodations for Learners with Special Needs	Maps accommodate the visual learners of the classroom. Discussion accommodates the linguistic learners. Zombie invasion spike many of the students interest that would otherwise not get involved (like ADHD students).

1. ENGAGEMENT		Time: Minutes
What the Teacher Will Do	Probing/Eliciting Questions	Student Responses and Misconceptions
The teacher will run into the class with ripped up clothing. The teacher will claim that a zombie invasion has started outside and the students will need to quickly figure out where they will need to go. The teacher will then ask the students to list several different biotic and abiotic factors we will need to account for to successfully survive (Water, Food, Warmth, Protection, Natural Hazards, Carrying Capacity, etc.).	What do we need to survive? What else should we look at? How about the time it will take to get to the location?	Students could be distracted by teacher clothing. Students may not fully understand biotic and abiotic factors yet. Students could get overly excited.
Evaluation/Decision Point Assessment		Student Outcomes
The teacher will be looking for participation, engagement, and brainstorming of ideas.		Students should be brainstorming the differing factors involved in survival. Additionally, students should be interested in the welfare of their class.

2. EXPLORATION		Time: Minutes
What the Teacher Will Do	Probing/Eliciting Questions	Student Responses and Misconceptions
At this point the teacher will bring up ARCGIS on the projector. The teacher will conduct a quick demonstration, showing how the students will find these differing factors through different GIS layers such as topography, temperature, rainfall, and population density. Each student will be assigned a different layer and need to find the most optimal spot to go in the event of a zombie invasion based on the layer that they are looking at. Once they have found a spot they will need to put a 'pin' in it and group up into 4s (each person with a different layer). The groups will look at all their layers and collaboratively find one optimal location. The teacher will walk around at this point and install directional inquiry questions where needed.	What areas do you think will be the best for survival? Why? What type of rain/temperature conditions are easier to survive in? Which areas have higher rainfall? Why do you think that is? What are other characteristics about areas with high rainfall? Would those characteristics affect your survival as well? What types of topography could be a source of protection? Or a source that could provide essential nutrients/food/water? What areas would be harder for zombies to reach? Where are zombies most likely to be attracted to? Where is the 'zombie virus' most likely to spread?	Students could have trouble working the program. Students could become off task.
Evaluation/Decision Point Assessment		Student Outcomes
Critical thinking and analysis of where to go in a zombie invasion. Integration of different GIS layers.		A pin on their map of where they think is best to go

3. EXPLANATION		Time: Minutes
What the Teacher Will Do	Probing/Eliciting Questions	Student Responses and Misconceptions
At this point the students will be asked to justify the choice they made against the class. Each group will go in front of the class with their map data and will give their say in what we should all do. At the end of each presentation the class will ask questions to each group.	Why did you chose the location you did? What factors did you consider? Why? Could we improve this area in any way? How do we make the downfalls of this area easier to live with? What are the weaknesses of this area?	Students' claims may not be supported by data from their GIS layer. Students could have different values in choosing a location which could spark some debate. Students could be lost in the lore of zombies rather than the geospatial portion of the lesson.
Evaluation/Decision Point Assessment		Student Outcomes
In depth discussion of the characteristics of the area and how they are compatible with survival/how they are not		Participation.

4. ELABORATION		Time: Minutes
What the Teacher Will Do	Probing/Eliciting Questions	Student Responses and Misconceptions
The teacher will then ask about the long term viability of one of these areas. The groups will then be given time to evaluate their choice again taking into account the group discussion and the long term viability of their choice. This will be an extension of the discussion but they will be responsible for applying some of the discussion points in the evaluate portion of the lesson.	How long do you think you could last in this location? Did you account for the climate of this location? How does climate change in the span of a year? On a year to year basis? Is this type of climate sustainable? What types of animals migrate through these areas? How likely is a natural disaster to pass through one of these areas?	Students becoming overwhelmed with all the different dimensions that apply. Disengagement from the activity is possible because of this. Thinking too broadly or too narrowly.
Evaluation/Decision Point Assessment		Student Outcomes
The teacher will be looking for student participation and creative thinking when it comes to looking at a long term scale.		Critical thinking and integration of multiple aspects of survival and geography.

5. EVALUATION		Time: Minutes
What the Teacher Will Do	Probing/Eliciting Questions	Student Responses and Misconceptions
The students will be asked to write a paragraph explaining their reasoning behind their location choice.	Are there aspects of your first location that you might change because of our discussion?	Students still confused and overwhelmed by the number of different factors that play into survival and geographic distribution of people.
Differentiation		Time: N/A
Students who are behind or need support	For advanced or gifted students	
Focus on just one dimension of survival and geographic distribution of people (one layer of a GIS map).	Integrate multiple layers of a GIS mapping system.	