

Examining the Environmental and Economic Impact of the Highway 371 Bypass in Baxter, Minnesota through Geotechnology

OVERVIEW & OBJECTIVES	GRADES
<p>In this lesson students will use spatial thinking, primary sources, and geotechnology tools to identify the impact of the Highway 371 bypass on the visible landscape in Baxter, Minnesota. Students will use ArcGIS and the WeExplore online learning program to describe changes in the landscape when transportation arteries are diverted or redirected.</p> <p><i>Students will be able to...</i></p> <ul style="list-style-type: none"> • Use maps generated by ArcGIS to gather, organize, and analyze geospatial information. • Identify and analyze community landscapes and changes to those landscapes using news articles, digital imagery, and online mapping tools. • Predict the future impact of an additional bypass on the neighboring town of Pequot Lakes. 	9 th
	TIME
	1 – 2 classes
	REQUIRED MATERIALS
	<ul style="list-style-type: none"> ✓ Computer Internet access for students ✓ Handouts: “Student Handout 1: Directions”; “Student Handout 2: Questions” <p><i>[Note: This lesson assumes that students have a basic understanding of ArcGIS.]</i></p>
MINNESOTA SOCIAL STUDIES STANDARDS & BENCHMARKS	
<p>Standard 2. Geographic Inquiry is a process in which people ask geographic questions and gather, organize and analyze information to solve problems and plan for the future. 9.3.1.2.2 Use geospatial technologies to develop plans for analyzing and solving local and regional problems that have spatial dimensions.</p> <p>Standard 6. Geographic factors influence the distribution, functions, growth and patterns of cities and human settlements 9.3.3.6.3 Describe how changes in transportation and communication technologies affect the patterns and processes of urbanization of the United States.</p>	

SUGGESTED PROCEDURE

Opening

The instructor should begin the lesson by handing out Student Handout 1 and Student Handout 2, which include both the instructions for the lesson and the questions based on the lesson. (Students may also access both documents on the WeExplore website.) The instructor should provide a brief overview of the lesson and the objectives as well as brief background about how the bypass was constructed in 2000. If the class is located close to the Baxter region the instructor may ask the students if they travel on, or shop near, the Highway 371 bypass.

Explain to the students how to use the links listed within Student Handout 1. This lesson will go much quicker if Student Handout 1 is provided online for the students to click on the links as they work through the lesson.

Development

The entire lesson, “Highway 371 Bypass Impact”, is located on WeExplore. Students move through the steps in the WeExplore Expedition and complete written work with each sequential portion of the expedition.

As the students work through their handout they should analyze changes to the landscape around the Highway 371 bypass using the provided aerial photographs in ArcGIS. The students will zoom in the maps and report any major changes to structures or environment. The students will also be asked to look at an ArcGIS map showing population changes in the region from 2000-2010. It might be useful to stop the class before they get to this point to make predictions on population changes for Baxter and for Brainerd. If there is time, the students can also examine the area’s traffic volume map to see the flow of traffic along the bypass compared to the old route. After the students have analyzed the maps and completed Student Handout 2 through question 11 the class should discuss their responses.

Students should be able to answer the following question as a result of this lesson: How has the construction of the Highway 371 bypass in Baxter, Minnesota in 2000 altered the landscape of the city and the neighboring city, Brainerd, Minnesota? The instructor could then ask the students to predict the future development of the Brainerd/Baxter region.

Closing

At the close of the activity, watch the news clip from Lakeland News PBS as a class. The clip discusses the proposed bypass around the city of Pequot Lakes, located just north of Baxter. The students should examine the video and the map of the proposed bypass and speculate how the landscape around Pequot Lakes may change after the bypass is completed. I would suggest that the students write their speculations first and then discuss them as a class.

Assessment

Class discussion

“Student Handout 2: Questions”

Website Resources

“Highway 371 Bypass Impact” at WeExplore Expeditions

<https://we-explore.com/expeditions/1763>

WeExplore Website Resources

“Welcome to Baxter” at City of Baxter

<http://www.baxtermn.gov/>

“1991 Aerial map of Highways 210 and 371 intersection” at ArcGIS

<http://arcg.is/1LX49Kp>

“2013 Aerial map of Highways 210 and 371 intersection-copy” at ArcGIS

<http://arcg.is/1M0SIF5>

“Traffic Volume Map” from City Maps at City of Baxter

<http://www.baxtermn.gov/government/city-maps/>

“Highway 371 Bypass Impact on Baxter, Minnesota: Population Change” at ArcGIS

<http://arcg.is/1LX4P2H>

“COSTCO” from Woodbury at Patch

<http://patch.com/minnesota/woodbury/report-costco-picks-woodbury-site>

“Baxter Zoning Map” from City Maps at City of Baxter
<http://www.baxtermn.gov/government/city-maps/>

“Highway 371 Pequot Lakes Bypass-Lakeland News at Ten-February 18, 2015” Video at YouTube
https://www.youtube.com/watch?v=5ZOzLPP_w6A

“Hwy 371 four lane expansion” at Minnesota Department of Transportation
<http://www.dot.state.mn.us/d3/hwy371/>

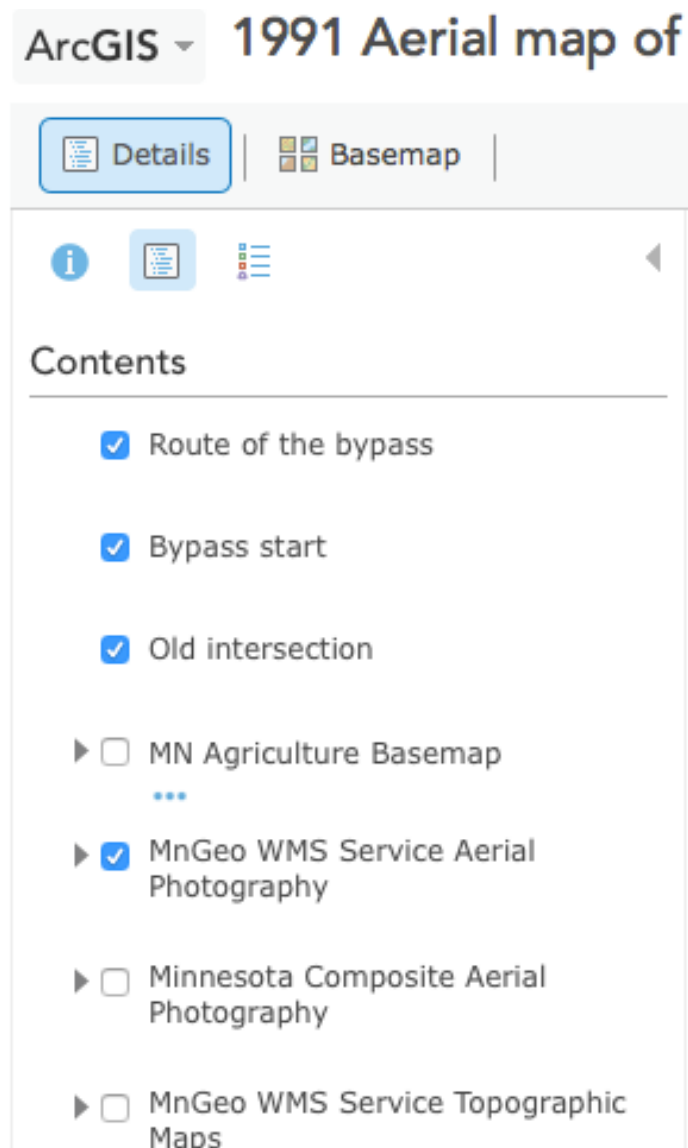
Student Handout 1: Directions

Examining the Environmental and Economic Impact of the Highway 371 Bypass in Baxter, Minnesota through Geotechnology

Task: Using geotechnology and spatial thinking, identify the visible changes over time in a landscape, specifically the Highway 371 bypass in Baxter, Minnesota. Using the maps provided predict how another bypass in a nearby town may impact that landscape.

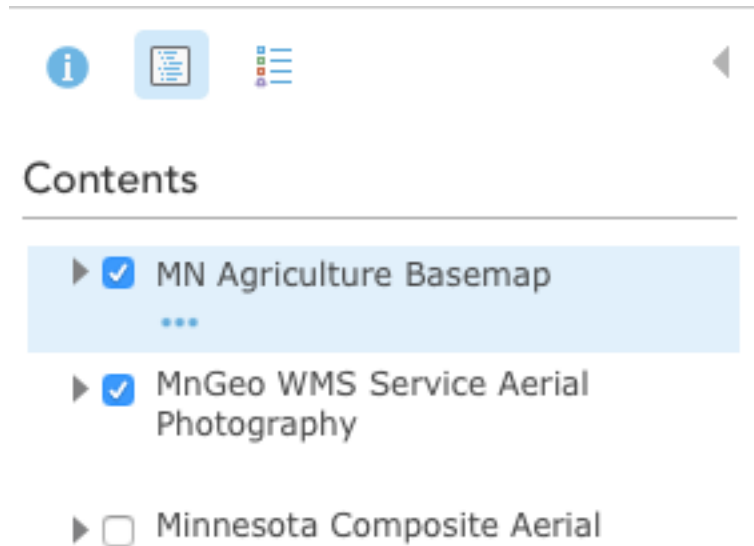
Procedure:

1. Go to <http://arcg.is/1LX49Kp>.
2. When you open the map you should be able to click on the “Contents” icon to see the different layers. It should look like this:



3. If you turn the layers off and on you may see on the map where the bypass begins today, where it ends, and the eventual route it will take.

4. Analyze the map and **answer questions 1 and 2 on Student Handout 2.**
5. Next, go to the following map <http://arcg.is/1M0SIF5>. Answer **question 3 on Student Handout 2.**
6. Zoom in to the intersection of the Highway 371 bypass and Highway 210 in Baxter. If you cannot see the intersection make sure that the “*MN Agriculture Basemap*” is turned on. It should look like this:



7. Once you find the intersection you may choose to zoom in to a level in which you can identify the buildings around the intersection. **Answer questions 4 through 7 on Student Handout 2.**
8. Next go to <http://arcg.is/1LX4P2H>.
9. Click on the “*Legend*” icon and read through the information provided.
10. **Examine the map and answer questions 8 through 11 on Student Handout 2.**
11. At this point you may close out of the maps and go here: <http://www.baxtermn.gov/government/city-maps/>. This website is from the city of Baxter. Scroll down and click on the link to the “*Traffic Volume Map*”. Use the zoom feature on your computer and zoom in to the bypass and then to the original highway route. Analyze the traffic numbers and you will notice that the bypass is used much more than the original highway route that goes through Brainerd.

At this point stop and wait for your instructor to play a video at the end of the class period. **Complete Student Handout 2 as you work together in class.**

Student Handout 2: Questions

Questions for Examining the Environmental and Economic Impact of the Highway 371 Bypass in Baxter, Minnesota Through Geotechnology Activity

Directions: Please answer the following questions as you work through Student Handout 1.

1. What does the map found in Step 1 display?
2. Zoom in along the route that will become the Highway 371 bypass. What do you notice in terms of human development?
3. What are some of the key features displayed by the map in Step 5?
4. Examine the 2013 Aerial Map of Highways 210 and 371 Intersection and the 1991 Aerial Map of Highways 210 and 371 Intersection. Based on your analysis of the two aerial photographs, how has the landscape around that intersection changed since the construction of the bypass?
5. What types of structures appear to have been built along the bypass?
6. Based on your findings in questions 4 and 5, describe the impact that the bypass seems to have had on the development and expansion of Baxter, Minnesota.
7. If the region around the intersection has changed in such a manner, what do you believe the population of the city of Baxter has done since the construction of the bypass? Make your prediction here.
8. What kind of data is displayed in the map from step 8?
9. Compare the data for the census tracts in Baxter to those in Brainerd. What does this data tell you about the population trends for both cities?
10. Do you believe it is possible that the construction of the bypass is partially responsible for this population trend? Why or why not?

11. How do you think the landscape in this region will change in the future? Think of the area around the bypass and the Brainerd/Baxter area in general. What evidence from this activity supports your prediction?

Questions 12 and 13 will be completed after watching a short video at the end of class.

12. What types of changes to the landscape do you believe will happen when the bypass around Pequot Lakes is built?

13. Based on the changes to the landscape around the Highway 371 bypass in Baxter, should a business owner along the current Highway 371 route in Pequot Lakes be concerned about customer traffic past their business? Why or why not?