

METHOD

Students use choropleth maps and the thematic timeline on www.WorldPopulationHistory.org to research how humans' changing use of land has altered Earth's physical landscape, and display their findings by creating a comprehensive Story Map Journal using ArcGIS.

INTRODUCTION

The expanding human population, in concert with technological innovation, has had a considerable impact on Earth's physical landscape over the past 200 years. Human needs are constantly evolving, greatly changing the ways in which we use land. Practices such as agriculture, deforestation, and urbanization have had a profound effect on the natural landscape, and as our numbers increase, their impact intensifies. We have entered into the Anthropocene, a new geologic epoch in which human activity drives and shapes Earth's natural systems. We are increasingly taking land out of its natural state to meet our growing needs. The cause and effect relationship between our growing population and its impact on our planet is a complicated one that requires us to carefully consider how we are using one of our most limited resources, land.

Part 1 is a pre-class reading and in-class discussion. Part 2 is an in-class activity. Part 3 is an out of class project. Leave 15 minutes at the end of the class period to describe Part 3.

MATERIALS

- Websites: www.WorldPopulationHistory.org, storymaps.arcgis.com, and photos.google.com
- Student Worksheet

PREPARATION, BEFORE CLASS

Request an ESRI ConnectedED account (optional): ESRI offers free commercial grade ArcGIS Online to U.S.-accredited K-12 schools. This is optional because students can easily register individually for a free public account to create their Story Map Journals.

Set up a Google Photos account for the class: Images to be used in Story Maps must be hosted online. We suggest using

CONCEPT

Human's demand for essential resources is a direct cause of modifications to Earth's landscape, many of which have had significant, and often irreversible, environmental impacts.

OBJECTIVES

Students will be able to:

- Identify changes in human land use trends by analyzing anthropogenic data.
- Describe how human activities (such as agriculture, urbanization, and deforestation) have impacted land use.
- Draw connections between historical events and land use changes, and present conclusions using GIS Story Maps.

SUBJECTS

AP Human Geography, World Geography, Environmental Science (General and AP), World History (General and AP)

SKILLS

Interpreting geospatial data, research, designing and building a digital Story Map

Google Photos to host images. There are two options: 1) create one Google account for the class to access and host images (be sure to share account username and password with students) or 2) have students use their own personal Google accounts. To set up an account, go to photos.google.com and follow the directions (it's free).

PART 1

Exploring the Human Land Use Overlay

Procedure

1. The day before you plan on using this lesson: Assign the ESRI Story Map, [Welcome to the Anthropocene](#) as a reading. Assign three questions from the Anthropocene Teacher Question Bank (or create your own) for homework and ask students to come to class prepared to discuss the reading.

2. In class the following day: Briefly discuss the reading. What did students find most interesting? Have a few students share their answers from the assigned questions.

3. Display the website WorldPopulationHistory.org. Enable the Human Land Use Overlay on your map (select Overlays, click Human Land Use) and turn off the Population Dots (select Map Features, click Population Dots so it is no longer highlighted blue) to see the colors of the overlay more clearly. Explain to students that they will be watching changes in global land use from 1700-2000. Click the “play” button to see an animation of changing land use types from 1700-2000 and ask students to make mental observations on what they see. You may want to play the Overlay multiple times, and slow it down to give students adequate time to make observations.

4. Turn on the Population Dots (select Map Features, click Population Dots so it is highlighted blue) and again play the Human Land Use Overlay. Ask students to think about how population might have influenced changes in land use from 1700-2000.

Discussion Questions

1. What stood out the most from the Human Land Use Overlay?

Answers will vary.

2. What are examples of human land use?

Answers may include: agriculture; forestry; industrial infrastructure; urbanization; excavating for natural resources; waste facilities; transportation; recreation.

3. Has human population growth changed how land is used? If so, how?

Yes, human population began to grow exponentially in the late 18th century as a result of the Industrial Revolution. As population has expanded so did the need for housing, food, and resources which led to extensive changes in the landscape. Human activities like large-scale clearing of forests for both settlement and agriculture and strip mining of coal for energy have significant impacts on physical geography.

4. How have changes in people's use of land impacted the Earth's environment? Have the impacts been positive or negative?

Yes, human land use has impacted the environment. Impacts include: climate change; deforestation; erosion; water and air pollution; habitat destruction; desertification; soil erosion; loss of biodiversity; acid rain; ozone depletion; and water scarcity – these are negative. There are some positives as well, such as improved public transit options, urban green-spaces, innovation in building and development.

5. How might we mitigate the effects of human activity on our terrestrial environment?

Possible answers include: sustainable development; urban growth boundaries; setting land aside to be protected through wildlife preserves or National Parks; increase availability and use of public transportation to reduce the amount of highways and paved lands; rooftop gardens; sustainable agricultural practices.

6. What do you notice about the places where people settled in 1800 versus today?

People are increasingly moving to urban settlements. Today, over 50% of the global population resides in urban areas. This number is projected to increase to 68% by 2050.¹ Starting in 1950 we began to see the emergence of megacities (cities with a population of 10 million or more). There were 10 megacities in 1990, 33 in 2018, and 43 are projected by 2030.²

PART 2

Humanity's Influence on the Planet

Now that students have seen how some areas of land have been altered over time, they will connect these changes with historic events found on the timeline at www.WorldPopulationHistory.org, and answer the question: How has human's use of land throughout history caused lasting changes to Earth's surface?

Procedure:

1. Distribute the Student Worksheet and direct students to www.WorldPopulationHistory.org. They will fill out columns A-D on their Worksheet. The Student Worksheet can either be used and assessed as the final product of the lesson, or it can serve as an outline for the Story Map Journals in Part 3.

2. Go over the instructions on the Student Worksheet. You could provide the following example for completing the table.

Example:

A – Meat Consumption

B – 1999

C – In the past 55 years, the amount of meat consumed in developing countries has more than doubled.

D – Raising animals for food requires large areas of land to accommodate their grazing. In Sub-Saharan Africa, much of which is considered developing, the Land Use Overlays shows that large areas have changed from wildlands to rangelands in recent decades.

E – Screenshot of Africa with the Land Use Overlay in 2000.

PART 3

How to Create a Story Map Journal

Procedure:

1. Look over columns A-D on the Student Worksheets before moving on to Story Map Journals to ensure students are on the right track.
2. Display storymaps.arcgis.com and go over the Instructions for Your Story Map Journal (located on the back of the Student Worksheet) with the class.

Each section should include a writing component and a supporting piece of multimedia or image, whether a map, infographic, or photograph. Each Story Map Journal should include at least one relevant map (there are hundreds to choose from on the ArcGIS Online database). You may want to revisit “Welcome to the Anthropocene” or show examples of student-created Story Maps.

An example of a story map created by students: [The Royal High School, England](#)

3. Display photos.google.com and go over the Instructions for Google Photos (also located on the back of Student Worksheet) with the class.

Encourage students to use their own images or images held in Creative Commons licensing which include most images on Wikipedia and images from U.S. government agencies. [Flickr](#) users have the option to offer their work under a Creative Commons, making it a great website to search for images.

4. When finished, students submit their Story Map to the teacher sharing a customized link that is available upon completion. Students also have the option to share their Story Maps on a variety of social media platforms should they choose to do so.

ASSESSMENT

Assess students’ completed Story Map Journals based on if they covered at least five events and included appropriate information (year, summary, support, and image) for each. You may also review the Student Worksheets.

^{1,2}United Nations, Department of Economic and Social Affairs, Population Division. (2019). *World Urbanization Prospects: The 2018 Revision (ST/ESA/SER.A/420)*. Retrieved from <https://population.un.org/wup/Publications/Files/WUP2018-Report.pdf>

Name: _____

Date: _____

Directions:

Go to www.WorldPopulationHistory.org and select the Human Land Use Overlay. Under Themes, you can deselect all but one theme at a time, or select all themes at once to get an idea of how the milestones overlap with one another. Choose 5-8 historic events from the Timeline that answer the following question and use the table below to organize your ideas and research for your Story Map Journal:

How has human's use of land throughout history caused lasting changes to Earth's surface?

A – Event	B – Year	C – Summary	D – Support	E – Image
Choose a milestone event from the timeline.	Record the year(s) the event took place.	In your own words, summarize the milestone event.	How does the event support the bolded statement above?	Ideas for possible multimedia, images or maps.

Instructions for Your Story Map Journal:

1. Go to storymaps.arcgis.com and create an ArcGIS Public Account. Click on **Sign in** in the upper right corner of the website. Then click on **Free non-commercial public account** in the lower left.
2. Login at storymaps.arcgis.com.
3. Scroll down to the image of the laptop. Scroll through the different types of Story Maps until you find the Story Map Journal. Click on the image of the laptop.
4. From this page you can explore the Map Journal gallery for examples of **Story Map Journals**. You can also access the step-by-step instructions for how to build a Story Map Journal. (Under **Creating your story with the Map Journal Builder**, click on **Follow step-by-step instructions**.)

Instructions for Google Photos:

1. Go to photos.google.com and click on **Go To Google Photos**. Follow the instructions to set up the software on your computer.
2. If your teacher has given you a login and password – use that information to login here. Otherwise, you will need to create a Google account.