

Lesson Plan - Middle and High School Land Use and Land Cover Introduction

Understanding Land Use and Land Cover using ArcGIS Online

Image – an image is a *representation of reality*. It can be a sketch, a painting, a photograph, or some other graphic representation such as satellite data. Satellites capture and store electromagnetic waves that are reflected or emitted from features on the Earth, somewhat like a camera.

Remote Sensing – remote sensing can be defined as the scientific and technical discipline that involves acquiring information of various Earth features from a distance. Sometime the distance is great, such as satellite-based remote sensing where the satellites are in orbit high above the Earth; other times the distance is much less, such as aircraft-based remote sensing where the airplane is much closer to Earth.

Land Use and Land Cover can be defined as *how land is utilized*. Examples include 'Park', 'Intermediate Density Residential', and 'Industrial'.

Land cover is slightly different. A park, for example, could be a deciduous forest, a conifer forest, or a mixed forest, or some other type of natural or artificial ecosystem. The land use in this example is 'Park', while the land cover would be deciduous forest, conifer forest, or mixed forest. Similarly, an 'Intermediate Density Residential' land use would be considered one type of developed land use.

Keep it simple, as this can be confusing if complicated examples are used. Also keep in mind that there is some overlap between land use and land cover. For example, agricultural land use can also be agricultural land cover, if the type of agriculture is not defined in more detail.

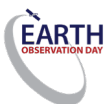
National Generation Science Standards:

Learning Objectives:

Upon successful completion of this exercise, students will be able to:

- Define land use and land cover
- Provide examples of land cover classes
- Understand how to create a simple land cover map

This exercise was developed using ArcGIS Online.



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Teacher Prep time: Depends on the teacher's experience with ArcGIS Online. One hour is required for those who are new to ArcGIS Online. Fifteen minutes is required, to review the lesson, for those with a working knowledge of ArcGIS Online and an understanding of land use and land cover.

Class Time Requirement: 50 minutes

Materials needed: Windows or Mac computer with Internet connection.

Teacher Prep Instruction: Explore the following website to familiarize yourself with the content <http://video.arcgis.com/series/18/arcgis-online>

Classroom Instructions: (Windows-based)

Access the following website to familiarize yourself with the concepts of Land Use and Land Cover - <http://landcover.usgs.gov/usgslandcover.php>

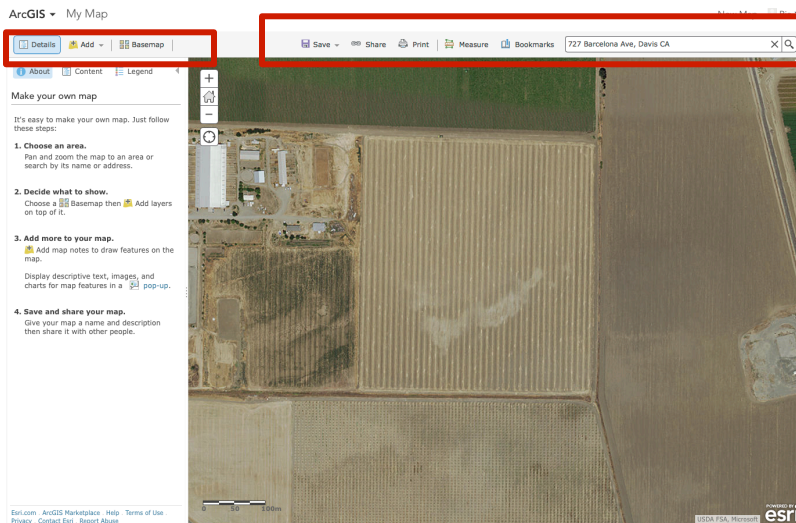
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Classroom Instructions:

- 1.) Start ArcGIS Online by going to <http://www.arcgis.com> and click sign in. You should sign in for a **Public Account** if your school does not have an organizational account. Please remember ArcGIS Online is free for all K – 12 schools. Then click **'Map'** at top of the page.



- 2.) Familiarize with the ArcGIS Online main menu.



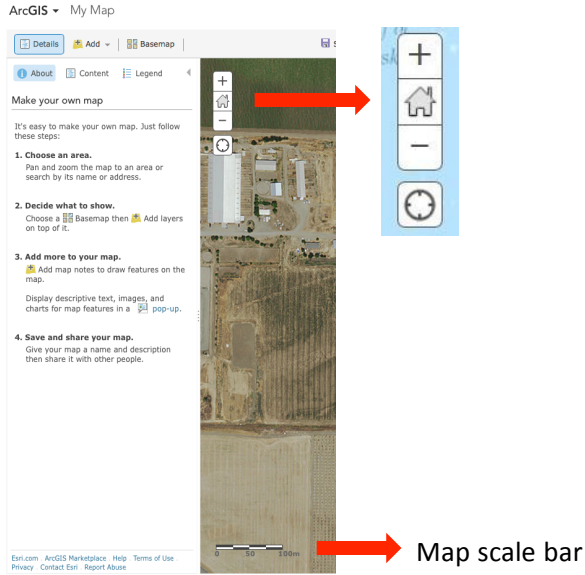
- 3.) Click on **'Basemap'** in the main menu and choose **'Imagery'**.
- 4.) On the right top corner you will see the search bar. Please type in the address of your

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school.

Find address or place 

5.) Using the Zoom tools, adjust the scale so that you can see your whole campus. You can adjust your map scale, as shown below.



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Suggested classroom questions:

What is the predominant *land use type* around your school? In other words, what is the most common land use type on the screen? Is it residential use, or forest, or agricultural, or some other type?

What is the second most common land use type?

What *land cover* types exist around your school? Think about the different spatial patterns (shown by various color and texture patterns in the imagery). What do these spatial patterns represent? Are they neighborhoods (developed areas, with residential development), or areas of dense trees (forests), or some other land cover type? List three land cover types.

Can you differentiate *natural land cover* from *developed land cover*? How might you tell the difference between natural and cultural features? Describe three natural and three cultural (man-made, or *anthropogenic*) land cover types around your school.

Natural features: _____ - _____ - _____

Cultural Features: _____ - _____ - _____

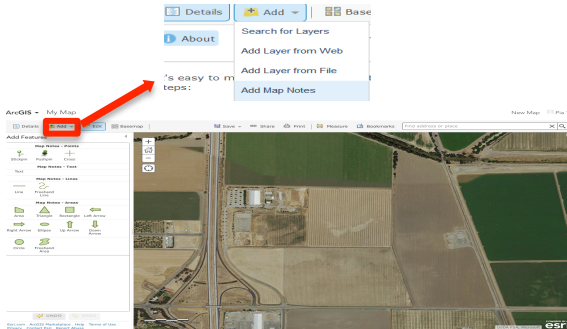


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Land Cover and Land Use Mapping

Now that you have identified several land cover and land use types, we will now begin to create a simple land use and/or land cover map of the area around your school (a map is a two-dimensional model of an area on the surface of the earth).

6.) With the screen showing the area around your school, click **'Add'**, then click **'Add MapNotes'**.



7.) Once you've selected the **'MapNotes'** by clicking on it, you will see a box appear.

Add Map Notes

Name:

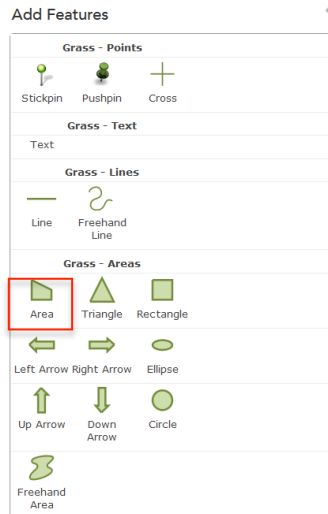
Template:

Use Map Notes to create basic shapes in a wide variety of applications.

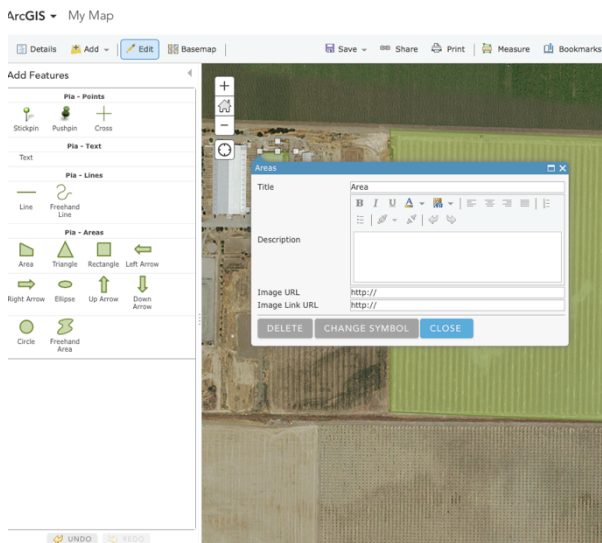
8.) In the Name section, please change Map Notes to Land Uses and/or Land Covers and click **'Create'**.

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9.) In the Add Feature Menu – choose **Area**.

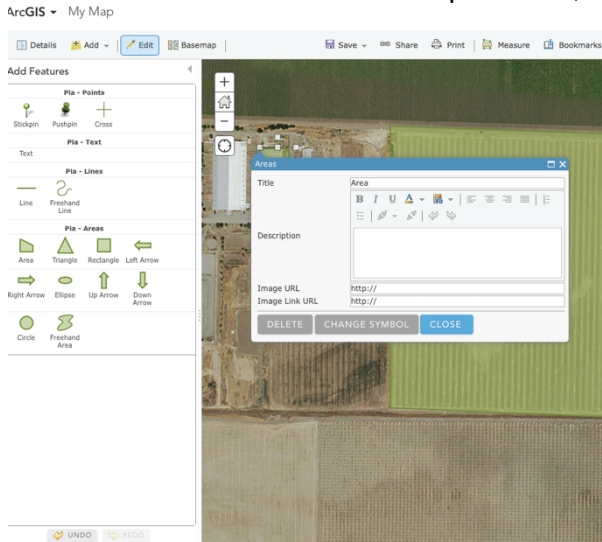


10.) Click on the corner of the first land use / land cover feature and move the mouse to draw a straight line. To change directions click the mouse. When completed double click and the **Area** menu will appear.

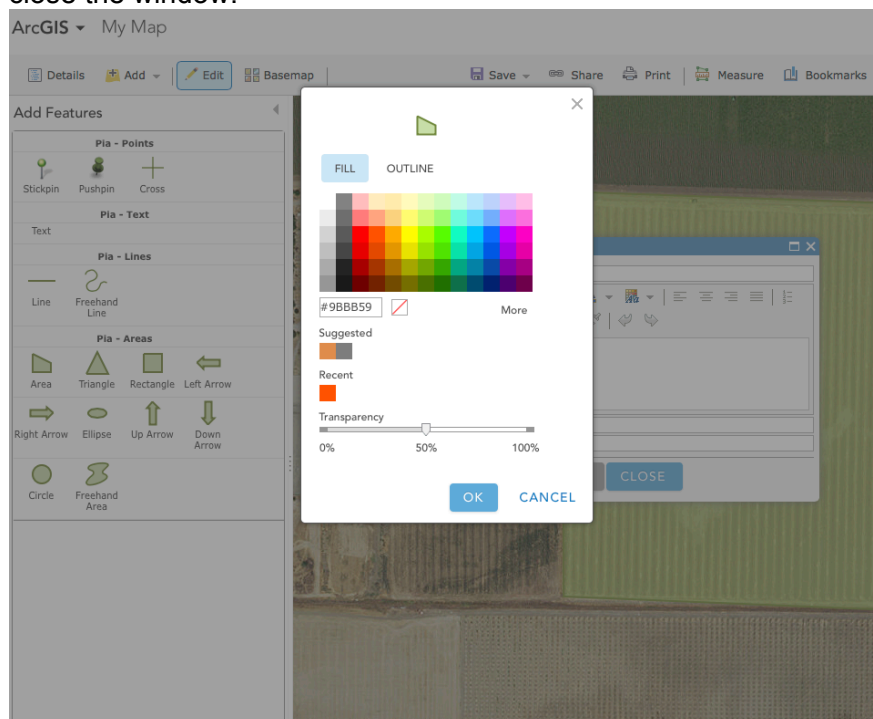


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11.) In Title – Name the Land Use (Field) and/ or Land Cover (i.e. Grass). You can add additional information in the description field, insert URL and link the image to an existing URL.



12.) Click '**Change Symbol**' and choose appropriate color for fill and outline. Click '**OK**' to close the window.



Hint: Practice drawing polygons and making adjustments to their borders.

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- 13.) Finish mapping the common land use types around your school by repeating steps 9 -12 for each land Use / land cover polygon.
- 14.) Click on the individual polygons to open the '**Area**' window to enter additional information,make changes or delete the feature.
- 15.) Continue to add features to your map using the **Add Feature** menu bar items of choice.

That's it! You've created a land use and land cover map.

