

**Using GIS to Analyze Agriculture's
 Connection to Development In Africa**

Geographic Content

- Human Development Index
- More Developed and Less Developed Countries
- Agricultural Development
- Biomes and Ecological Systems
- Economic Development

Literacy Strategies and Inquiry Practices

- Map Analysis
- Geographic Inquiry
- Data Supported Predictions and Arguments
- Data Mapping

Geospatial Technologies

- ArcGIS organization Account
- African Agriculture eatlas
<http://agatlas.org/content/>

<p>Teacher Learning Goal</p>	<p>Students will be able to explain the connection between agriculture and the economic development of a country. Students will analyze agricultural maps of Africa and make their predictions about the development based on their observations of different trends. Students will then compare their observations to the statistics of the Human Development Index using a mapping project designed to teach them mapping skills and to have them connect agriculture with development.</p>
<p>Student Pre-assessment</p>	<p>Students should answer the following questions before the activity and then discuss their responses as a class:</p> <ol style="list-style-type: none"> 1. List 5 factors that can lead a country to be less economically developed than other countries. 2. Which factor listed above do you think will have the greatest impact on the development of a county? Explain your reasoning.
<p>Student Learning Resources</p>	<p>African Agriculture and Development Handout (Below) Human Development Index Report (UN Development Programme) Agriculture and Development Map (Made using African Agriculture eatlas http://agatlas.org/content/) http://mrtredinnick.maps.arcgis.com/apps/webappviewer/index.html?id=6439873d9f81419cad60482fdcb6c174</p>
<p>Student Post-assessment</p>	<p>After completing the activity students will answer these questions:</p> <ol style="list-style-type: none"> 1. Explain the trends between your predictions of the more or less developed countries and the actual HDI levels of the country. 2. Summarize the importance of agriculture in development using African countries as an example. 3. Which agroecological Systems are the most useful for agriculture production? Which agroecological systems are the least useful? 4. What factors will determine whether an agroecological sytems are useful for agriculture? List and explain three factors 5. What might explain how some countries can have higher development, but poor agriculture?
<p>Teacher Reflective Statement</p>	

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Class Title:

Lesson Title: African Agriculture and Development

Name:

Section:

Score: ____/5

Directions: You will be examining the Development of Africa and the connection to Agriculture. You will have a map of your own with your own predictions of which countries are likely to have lower and higher development based on different agricultural factors.

Pre-Activity Thought Questions:

Directions: Before completing the activity answer the series of questions below.

1. List 5 factors that can lead a country to be less economically developed than other countries.
 - a.
 - b.
 - c.
 - d.
 - e.
2. Which factor listed above do you think will have the greatest impact on the development of a county? Explain your reasoning.

Examining Agriculture in Africa

Directions: Use the Agriculture and Development Application linked on the class website or by using the link below. Once you open the app take a minute to become familiar with the map by turning different layers on and off, and practice changing the opacity (the intensity of the visibility).

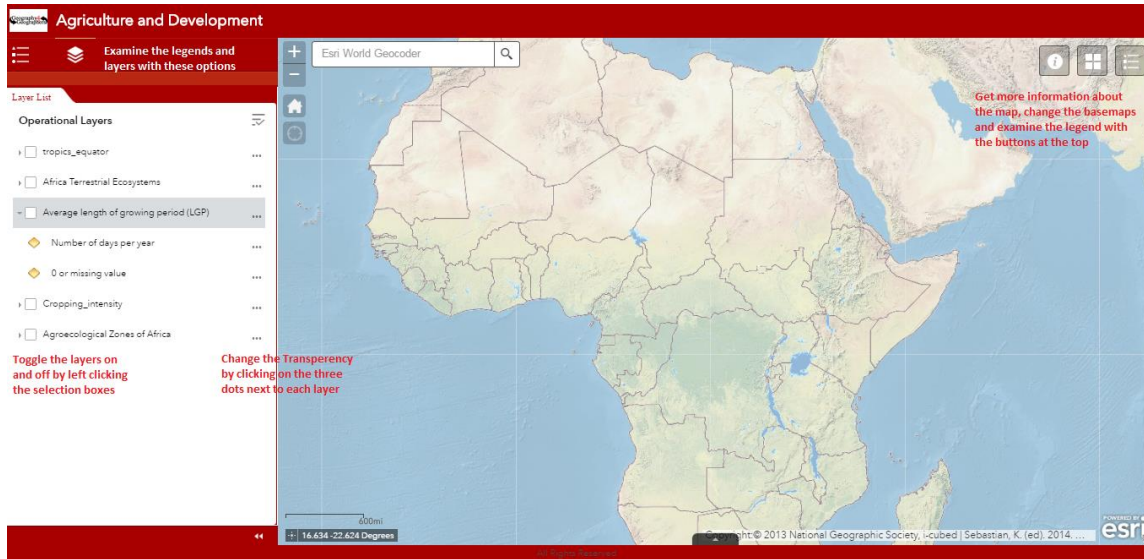
Application Link:

<http://mrtredinnick.maps.arcgis.com/apps/webappviewer/index.html?id=6439873d9f81419cad60482fdb6c174>

1. Take a moment to familiarize yourself with the application.
 - You can turn on the legend, change the basemaps, and get more information about the map with the buttons in the top right of the application
 - Examine the legend and the different layers with the two buttons in the top left of the application
 - o Turn layers on and off by clicking the boxes next to each layer
 - o Change the transparency and change the order of the layers by clicking the three dots on the right side of each layer

**Using GIS to Analyze Agriculture's
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2. Take some time to start looking through the layers and start coming up with your ideas of which areas of Africa may be more or less developed than other areas.
 - a. You will be making a map with your predictions using ArcGIS Online



Make your Prediction Map


Directions: After looking through the application come up with a list of 10 countries that you think will be less developed and 10 countries you think will be more developed based on their agricultural factors

Log on to ArcGIS

1. Your teacher will assign you an ArcGIS user name and password. The password you will change, but do not forget your **User Name**.

User Name: _____

Password: _____

2. Navigate to arcgis.com and in the top right  **Sign In** click on the button to begin logging in
3. On the next window you will be prompted to change your password. Type in the Old Password (the one given to you by the teacher) and then create a password of your own. Make it on you can easily remember, and it must have the following features.
 - Be at least 8 character(s) long.
 - Contain at least 1 lower case letter(s) (a-z).
 - Contain at least 1 letter(s) (A-Za-z).
 - Contain at least 1 number(s) (0-9).

It's time to change your password. [Follow these rules.](#)

Old Password

New Password

Confirm New Password

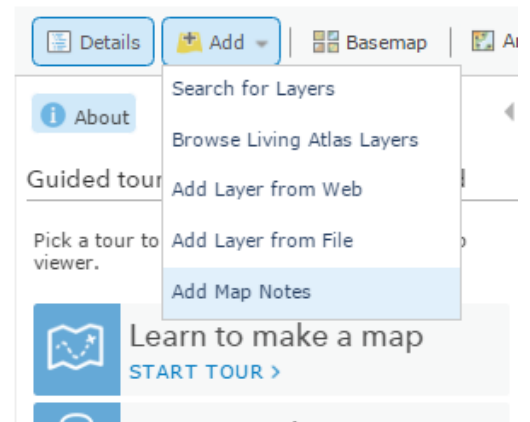
CHANGE PASSWORD

Using GIS to Analyze Agriculture's Connection to Development In Africa

4. On the next window that comes up after you have set up your password you can customize your user profile. Fill out a short biography that includes who you are, where you are from, and why you are using ArcGIS
 - a. Make a **security question** for you so you can reset your password if you forget it
 - b. Make sure your profile remains set so that only members of the **organization** can see it
 - c. Keep the language as **English** and the Units as **US Standard**

Making your Prediction Map

1. Open a new map
 - a. Once you are signed in left-click on the **MAP** option along the top bar to navigate to a blank map
 - i. If there is already data on the map or you need to start with a fresh map you can left-click the **Create New Map** option in the top right
2. Adding Map Notes
 - a. To actually add your predictions to the map you will be creating Map Notes with your 10 different predictions for less developed countries, and 10 predictions for more developed countries
 - b. Left-Click the **Add** Button along the top bar and select **Map Notes** from drop down menu
 - c. Scroll over to Africa and place markers on each of the 10 countries that you think will have lower development and the 10 countries you think will be more developed based on their agricultural characteristics.
 - d. Make the **Title** of your point the name of the country and then write your explanation of why you are predicting that country will be more or less developed in the **description** box.
 - i. Your explanations should be in complete sentences with at least two different pieces of geographic data to support your reasoning.
 - ii. You should use different colored pins for your more developed pins than your pins for the less developed countries.



Adding Geographic Data

1. Collect Your Data
 - a. Use the internet to search for the most recent **Human Development Report**.
 - i. The data should be found on the United Nations Development Programme website
 - b. Select **Data** along the top bar
 - c. Select Human Development Index (HDI) from the drop down menu that appears at the top of the page that comes up. Once that is selected select **Download Data** on the right side of the page
 - i. The data should then automatically open as an excel spreadsheet on your desktop

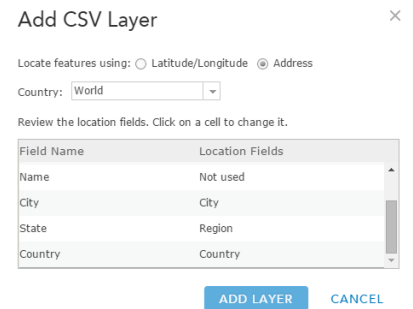
**Using GIS to Analyze Agriculture's
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2. Preparing the Data

- a. Once the data is open on your desktop review it and then save it as a **.csv** file in a place where you will easily be able to find it. When you save the data name it **Human Development Index**

3. Importing the Data

- a. Open your ArcGIS Map back up
- b. Left click the **Add** button to add content to your map and select **Add Layer From File**
- c. In the window that pops up it will ask you to search for the file you would like to import. Find the Human Development Index file you downloaded and select it.
- d. Make sure the file name readings Human Development Index.csv. As long as that is correct press the button.



4. Formatting the Data

- a. On the pop up screen that comes up called **Add CVS Layer** make sure that you are using the **Address Location Feature**
- b. For **Country** make sure that **World** is selected
- c. Make sure that the **Field Names** and **Location Fields** match up
- d. Once all of that is done click the **Add Layer** button in the bottom of the window



NOTE: If there is a problem uploading the data where it says duplicate field names are not allowed try opening your data set and removing the "Human Development Index" title over the rest of the other headings. ArcGIS is trying to read that as your data instead of the actual data headings.

5. Change the Style of your new Data

- a. In the side bar that opens you will have options to change the symbology of your new data set. Select that you would like to map the most recent HDI Numbers (The most recent year)
- b. **Counts and Amounts (Color)** should already be selected but if not than select it then scroll to the bottom of the side bar and select **Done**.
 - i. The Human Development Index should now be displayed on your map as circles. The bigger the circle, the higher the country's HDI is.


Saving and Sharing Your Map

1. Save your map

- a. Left click the  **Save** button along the top bar and select **Save As**.
- b. In the pop-up save menu give your map a **title** that includes you name.
- c. Add a short description of what you map shows in the **summary** area
- d. Add a few **tags** that include key words of what your map is displaying
- e. Make sure the map is saving to the folder for your username
- f. Once you are finished select 

Note: As with any type of project make sure that you save your map frequently to avoid losing your work if the connection is lost or you accidentally close a window

**Using GIS to Analyze Agriculture's
Connection to Development In Africa**

2. Publish your map
 - a. Click the  **Share** button along the top bar
 - b. Make sure the button is selected that allows you to share with members of your organization
 - c. You can copy and paste the link to a website to direct people to your map
 - d. Copy the link that is given and e-mail it to the teacher so they can see the map with your predictions and the HDI levels.

Note: People without an ArcGIS account will only be able to view your map if it is published to **Everyone**.

Post-Activity Thought Questions:

1. Explain the trends between your predictions of the more or less developed countries and the actual HDI levels of the country.

2. Summarize the importance of agriculture in development using African countries as an example.

3. Which agroecological Systems are the most useful for agriculture production? Which agroecological systems are the least useful?

Most Useful	Least Useful

4. What factors will determine whether an agroecological systems are useful for agriculture? List and explain three factors
 - a.
 - b.
 - c.

5. What might explain how some countries can have higher development, but poor agriculture?